Marine Review

THE BUSINESS OF TRANSPORTATION BY WATER

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NEW YORK CLEVELAND LONDON

Published Monthly
Vol. 57 No. 4

APRIL, 1927

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Your Guide To this Issue

Build More Ships

IN THE United States alone of all maritime nations shipbuilding receives no calculated encouragement. New construction for 1926 all for domestic trade shows an increase over the year before.

See Page 12

Our Active Trade

TRADE, coastwise, intercoastal, on harbors, bays, rivers and inland waters, is active and is constantly growing. This is reflected in the types of ships recently built and being ordered.

See Page 13

Distinctive Ships

A CROSS section of American shipbuilding is presented in the twenty-seven distinctive vessels chosen from all those under construction in 1926. Each one is separately illustrated and described in detail.

See Pages 14-66

New Ships Listed

VESSELS under construction in 1926 are listed with names, builders, owners and principal particulars. In this list only steel, powered merchant vessels appear. There are 121 in this category.

See Pages 56-57

M. S. Sawokla Trials

THE sixth shipping board freighter to be converted to diesel drive passed her sea trials off Hampton Roads with flying colors and immediately thereafter prepared for a voyage to South America.

See Page 67

A New System

A NEW and what appears to be a practical method for increasing the number of outside rooms on passenger vessels is suggested, fully illustrated, by a New York naval architect.

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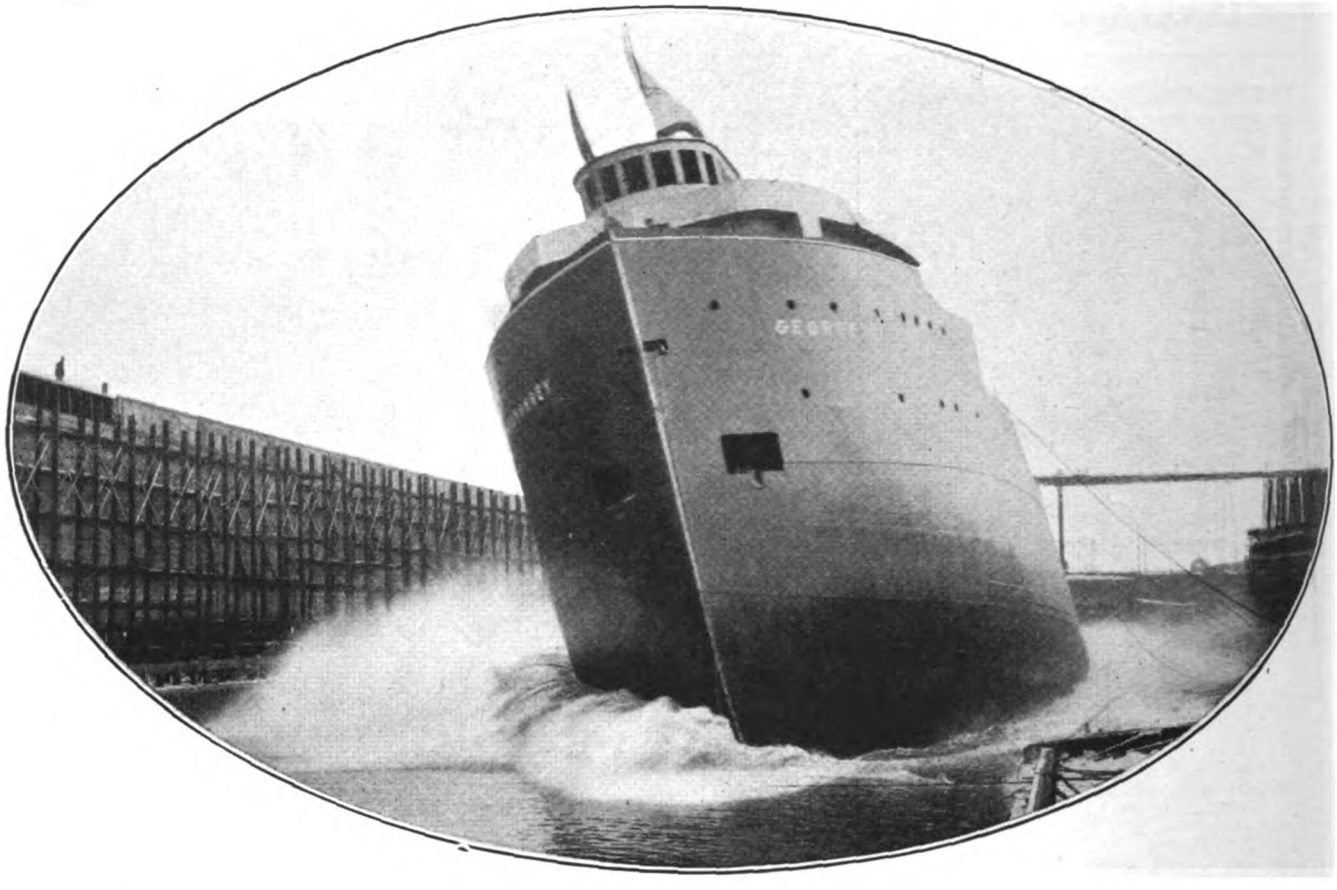
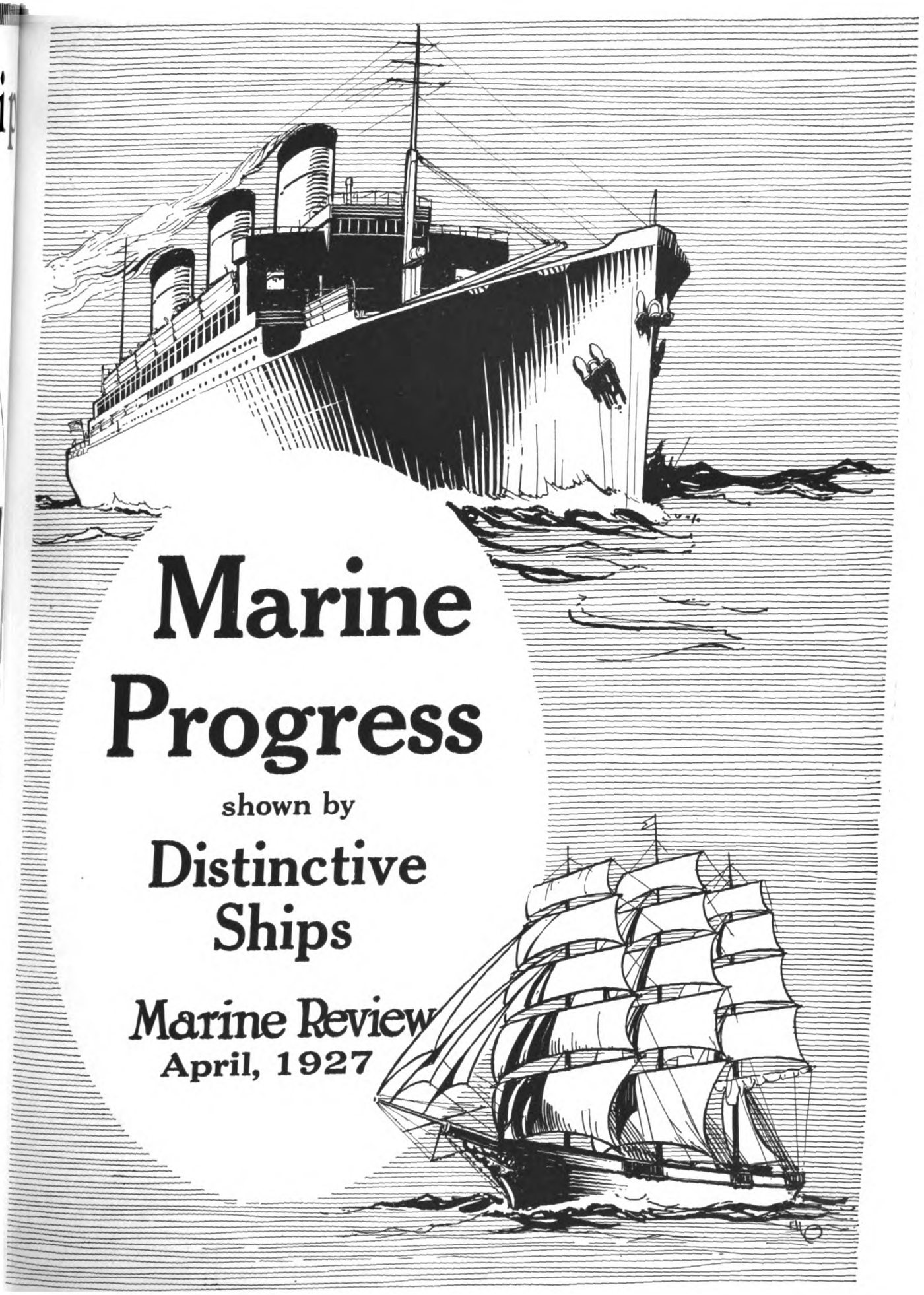
The American Ship



S. S. GEORGE M. HUMPHREY

Building for The Kinsman Transit Co.
Launched December 30, 1926



Marine Progress

shown by

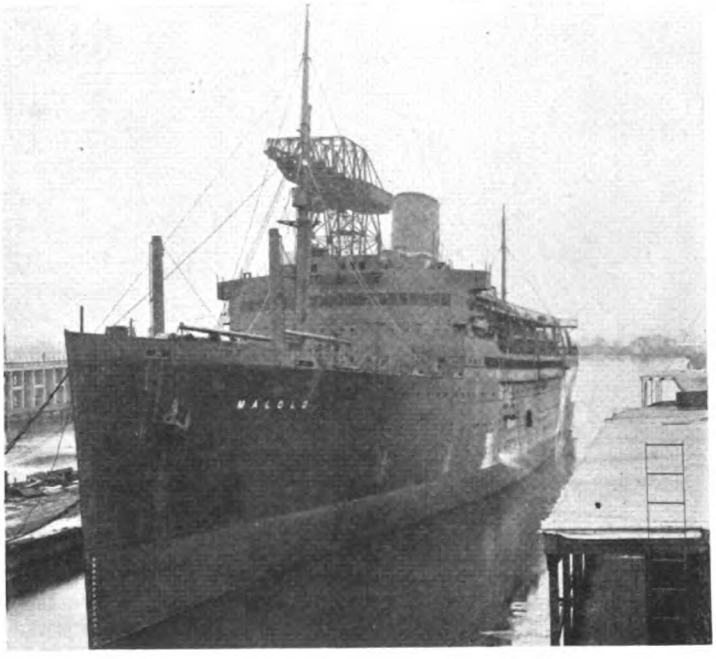
Distinctive Ships

Marine Review
April, 1927

Shipbuilding Increased in 1926

The Industry However Is in Poor Condition—Prices Are Low —Capacity Exceeds Demand—Naval Work Keenly Missed

By A. H. Jansson



Distinctive Ships

In the following pages will be found a review of shipbuilding in American shipyards during 1926. Steel, merchant, powered vessels over 100 gross tons, a total of 121 are listed. Of these, 27, chosen as distinctive, representing 45 in all, are described in detail, one to a page. This gallery of distinctive ships gives a cross-section of shipbuilding in the United States

SHIPBUILDING is an essential industry, necessary to the nation's welfare both economically and as an arm of defense. It has been and still is passing through a most difficult period of depression, though the situation is gradually improving as indicated by the following review of shipbuilding during 1926. Before the war the few established shipyards managed to go along fairly steadily due to naval work which stabilized conditions so that the intermittent merchant orders could be carried out at a reasonable profit. Then came the tremendous expansion of capacity to meet the urgent need for ships. Shortly after the cessation of this work the naval holiday was agreed on and with it the cancelling of contracts and the scrapping of ships already in progress. The over supply of merchant ships, which became acutely evident with the business depression of 1921, combined with the discontinuance of naval work left the shipyards, with tremendous investments in plant and equipment and with large trained staffs, in a desperate condition. It is, of course, easy to suggest that conservative handling of finances such for instance as that among the leading British concerns would have helped in meeting this difficult situation. But the fact remains that work at profitable prices is needed if the shipyards are to keep their highly skilled staffs and to maintain their elaborate plants and equipment in efficient condition. The outlook for the future is somewhat better, due principally to the recent action of congress in authorizing and providing the funds for beginning the construction of six 10,000-ton light cruisers. Bids on

Motive Power Compared—Two Years

Types	No. 1925	No. 1926	Pct. 1925	Pct. 1926
Steam reciprocating coal burner	36	38	33.7	31.4
Steam reciprocating oil burner	20	12	18.7	9.9
Steam turbine oil burner	14	9	13.1	7.4
Diesel engine, direct drive	21	32	19.6	26.5
Diesel engine, electric drive	12	26	11.2	21.5
Turbine-electric oil burner	3	3	2.8	2.5
Turbine-electric coal burner	1	1	0.9	0.8
Totals	**107**	**121**	**100.0**	**100.0**

Recapitulating for Primary Power

Types	No. 1925	No. 1926	Pct. 1925	Pct. 1926
Steam—as primary power	74	63	69.2	52.1
Diesel—as primary power	33	58	30.8	47.9
Totals	**107**	**121**	**100.0**	**100.0**

Recapitulating for Power at Propeller

Types	No. 1925	No. 1926	Pct. 1925	Pct. 1926
Steam—Direct and reduction gears	70	59	65.5	48.8
Diesel—Direct drive	21	32	19.6	26.4
Electric—Diesel and steam	16	30	14.9	24.8
Totals	**107**	**121**	**100.0**	**100.0**

Recapitulating for Fuel

Types	No. 1925	No. 1926	Pct. 1925	Pct. 1926
Steam—Burning coal	37	39	34.6	32.2
Steam—Burning fuel oil	37	24	34.6	19.9
Diesel—Diesel oil as fuel	33	58	30.8	47.9
Totals	**107**	**121**	**100.0**	**100.0**

these cruisers are called for in April and work should commence by July. The absorption of all shipping board surplus tankers and the fast approaching obsolescence of its other vessels should have a good effect in stimulating a demand for merchant ships. Whether operated by the government or turned over to private operators the United States lines without question will be continued. Its ultimate success and an increasing favorable attitude of the traveling public will depend on the addition of new large and attractive ships. Improved shipping conditions the world over is noted in the number of inquiries received and more orders would undoubtedly be placed except for the striking differential in cost at American and foreign yards. This disparity must be laid to the higher costs here of labor and material. The shipyards in this case unlike other industries are competing in a world market while not being able to procure in the same market their materials or labor, and at the same time getting none of the benefits of our established policy of protection. It seems only fair that this essential industry should receive in effect the protection afforded all other industries by some such application of the protective principle as suggested in the Pepper bill which was before the last congress.

Though conditions are not good, shipbuilding, for our domestic trades, including coastwise, bays and rivers, Great Lakes and inland rivers, goes on and is showing some improvement. A study and complete survey of merchant shipbuilding for the calendar year 1926 shows the actual conditions of the industry and brings out many important facts in regard to types of vessels and motive power. All steel merchant powered vessels of 100 gross tons and over completed, under construction or contracted for in American shipyards from Jan. 1, 1926 to Jan. 1, 1927 are listed on pages 56, 57. In this list are 121 vessels with their names or hull numbers, name of builder, owner, principal characteristics and intended service. From this list 27 vessels, representing through duplication 45 out of the total 121 have been selected as distinctive and typical of the present requirements of owners and the modern developments in efficient engineering and hull design.

Each one of the 27 vessels so selected is illustrated and described with all essential particulars of hull and machinery in the following pages from 14 to 66. This grouping together

(*Continued on Page* 74)

Analysis of American Merchant Shipbuilding—1926

Types of Vessels	No.	Recip. Coal	Recip. Oil	Turb. Oil	Diesel Oil	Die.Elec. Oil	Tur.Elec. Oil	Tur.Elec. Coal
Passenger—Ocean	5			4			1	
Passenger—Coastwise	8		3	5				
Passenger—Sound	1		1					
Passenger—Rivers	4		4					
Freighter—Ocean	0							
Freighter—Lakes	15	11			2	1		1
Freighter—Bay, Rivers	1				1			
Tanker—Ocean	3		1		2			
Tanker—Bay, Rivers	10				8	2		
Ferry—Harbors	21	5	1		3	10	2	
Ferry—Lakes	3	2			1			
Ferry—Bay, Rivers	6	3			3			
Carferry—Lakes	4	4						
Towboat—Harbors	11	2			3	6		
Towboat—Rivers	15	7	2		6			
Dredge—Harbors	5				2	3		
Special—Ocean	2	1				1		
Special—Bay, Rivers	7	3			1	3		
TOTALS	121	38	12	9	32	26	3	1

Distinctive Ships--Where to Find Them

Passenger Ships

Freighters

Ferries

Ferries (contd.)

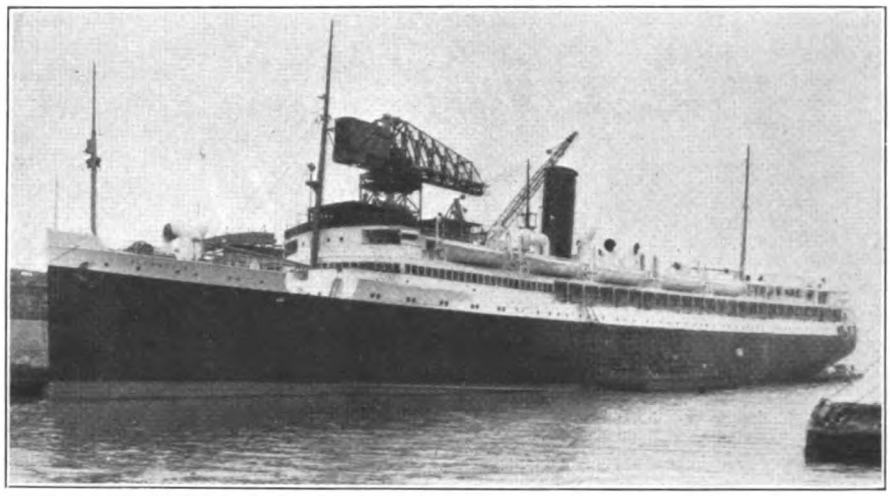
Tankers

Towboats

Special Types

See Pages 56-57 for Complete Shipyard Record

ALGONQUIN—Passenger—Coastwise—Single Screw Steam



Name—ALGONQUIN
Owner—Clyde Steamship Line
Builder—Newport News S. B. & D. D. Co.
Naval Architect—Theodore E. Ferris
Launched—Sept. 9, '26; completed, Dec. 10, '26
Sister Ships—CHEROKEE, launched Feb. 10, 1925, completed June 17, 1925; SEMINOLE, launched April 14, 1925, completed Aug. 10, 1925; MOHAWK, launched Oct. 21, 1925, completed Feb. 1, 1926.
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 402 feet 2 inches, length between perpendiculars, 387 feet 6 inches; breadth molded, 55 feet; depth molded to hurricane deck, 31 feet 6 inches; draft, 18 feet; displacement loaded, 7250 long tons; gross tonnage, 5945; net tonnage, 3546; passenger capacity, 373 first and 84 steerage; cargo capacity, 265,000 cubic feet; bunker fuel oil capacity, 643 long tons; speed, 15 knots.

MACHINERY PARTICULARS

Main Engine—One, geared steam turbine built by Newport News Shipbuilding & Drydock Co.; type, impulse; size, 4200 shaft horsepower; one H. P. and one L. P. unit.

Boilers—Four single ended, Scotch type, built, by Newport News Shipbuilding & Drydock Co.; size, 16 feet inside diameter by 12 feet long; heating surface, 13,680 square feet; fuel, oil.

DESCRIPTION

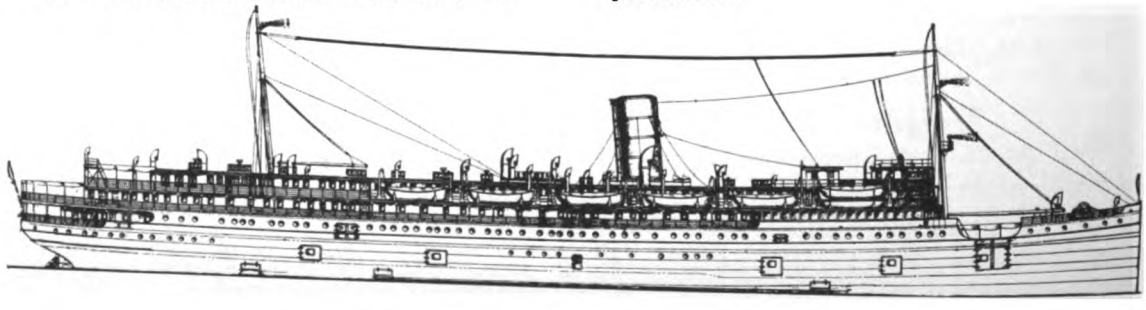
This fine ship is the last of four similar passenger and cargo vessels completed for the Clyde Steamship Line. These vessels are of the combination passenger and cargo coastwise type. All four are now in service between New York, Charleston and Jacksonville. Cargo handling facilities and passenger accommodations are exceptionally well worked out.

AUXILIARY EQUIPMENT

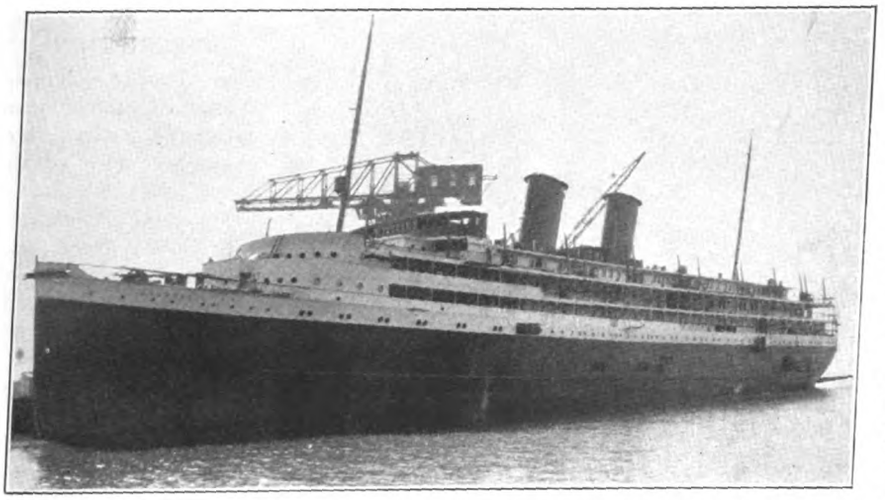
Manufacturers of:

Pumps—Worthington Pump & Mach. Corp.
Windlass—American Engineering Co. (elec.)
Winches—Lidgerwood Mfg. Co., electric drive, by Westinghouse Elec. & Mfg. Co.
Steering Engine—American Engineering Co.
Propeller—Newport News S. B. & D. D. Co.
Radio Equip.—Independent Wireless Co.
Telegraphs & Telephone—Chas. Cory
Refrigeration—Brunswick-Kroeschell
Oil Burning Equip.—Todd Shipyards Corp.
Electric Generators—Westinghouse Electric & Mfg. Co., two 60 kilowatt and one 100 k. w.
Life Saving Equip.—Welin Davit & Boat Corp
Fire Detection—Rich-Walter Kidde
Electric Motors—Diehl Mfg. Co.
Aux. Light—Matthews Eng. Co.
Evaporator—Griscom-Russell Co.
Oil Heaters and Coolers—Griscom-Russell Co.
Valves—The Crane Co.—Leslie
Feed Water Heaters—Griscom-Russell Co.
Deck Windows—Kearfott Engineering Co.

The freight decks are divided into water tight compartments, with side ports for quick handling of cargo. The holds and compartments are mechanically ventilated to insure fresh air and even temperatures at all seasons and in all climatic conditions for the protection and safe transportation of fruits, vegetables and other perishables.



IROQUOIS—Passenger—Coastwise—Twin Screw Steam



Name—IROQUOIS and SHAWNEE
Owner—New York & Miami S. S. Corp.
Builder—Newport News S. B. & D. D. Co.
Naval Architect—Theodore E. Ferris
Launched—IROQUOIS, Dec. 11, 1926
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 409 feet 4 inches; length between perpendiculars, 394 feet 6 inches; breadth molded, 62 feet; depth molded, 30 feet 6 inches; draft, 18 feet 6 inches; displacement loaded, 7560 tons; gross tonnage, 6500; net tonnage, 3800; passenger capacity, 589 first class and 114 steerage; cargo capacity, in cubic feet, 190,000; bunker fuel oil capacity in tons, 926; speed, 18 knots.

MACHINERY PARTICULARS

Main Engines—Two single reduction geared turbines; one H. P. and one L. P. in each unit; total shaft horsepower of the two sets, 8500; builder, Newport News Shipbuilding and Dry Dock Co.

Boilers—Six, Babcock & Wilcox, marine watertube boilers; with a total heating surface of 29,784 square feet; fuel, oil.

AUXILIARY EQUIPMENT

Manufacturers of:
Pumps—Worthington Pump & Mach. Corp.
Windlass—American Engineering Co.
Winches—Lidgerwood Mfg. Co.
Steering Engine—American Engineering Co.
Propellers—Crown Smelting Co.
Refrigeration—Brunswick-Kroeschell Co.
Oil Burning Equip.—Babcock & Wilcox Co.
Superheaters—Babcock & Wilcox Co.
Electric Generators—General Electric Co.
Life Saving Equip.—Welin Davit & Boat Corp.

DESCRIPTION

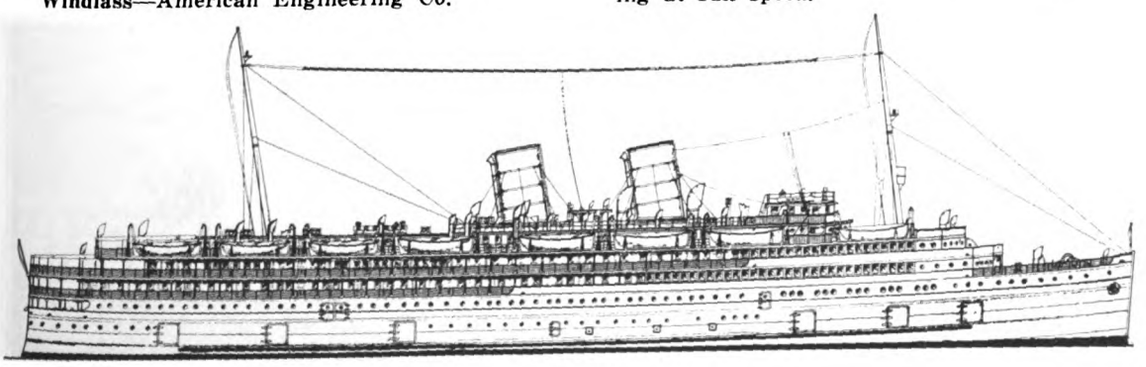
The steamer IROQUOIS and her sister ship SHAWNEE are designed to give express passenger service de luxe between New York and Miami. Accommodations are provided for five to six hundred first class passengers and about one hundred steerage. An unusually large proportion of the first class quarters are parlors, suites or special staterooms.

The twin screw coastwise passenger and freight steamer IROQUOIS and her sister ship SHAWNEE are being built by the Newport News Shipbuilding & Dry Dock Co. from designs by Theodore E. Ferris for the New York-Miami service of the Clyde Steamship company.

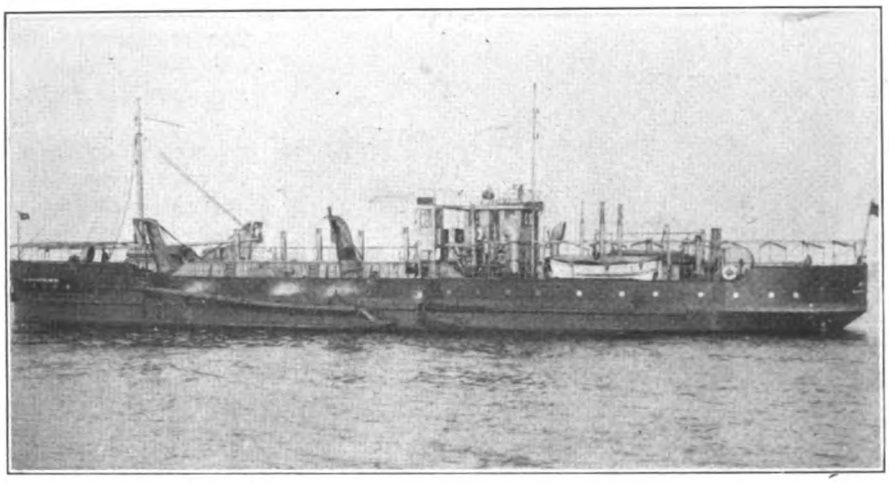
A total cargo capacity of 190,000 cubic feet is available in the holds and tweendecks, about 16,000 cubic feet of this being refrigerated cargo space.

Both passenger and cargo spaces are mechanically ventilated on a scale never before attempted in a ship of this class, the total volume of ventilation being in excess of that usually provided on an ocean liner of twice the tonnage.

These vessels will be driven at 18 knots speed by single reduction geared turbines with oil burning watertube boilers. The fuel tanks have sufficient capacity for thirteen days steaming at full speed.



WILLETS POINT—Dredge—Twin Screw—Diesel



DESCRIPTION

The hopper dredge WILLETS POINT was designed by the army engineers and represents the results of a great deal of experience with many different types. Motive power is furnished by twin diesel engines direct connected to the propellers. The overall dimensions have been kept down.

Name—WILLETS POINT
Owner—U. S. Army, Corps of Engineers
Builder—Federal Shipbuilding & D. D. Co.
Naval Architect—U. S. Engineers, Maj. Styer
Launched—June 26, 1926
Completed—Oct. 9, 1926
Classification—Owner's requirement

HULL PARTICULARS

Length overall, 200 feet; length between perpendiculars, 193 feet; breadth molded, 41 feet; depth molded, 19 feet 6 inches; draft, 16 feet 6 inches; displacement loaded, 2898 tons; gross tonnage, 1164; net tonnage, 558; cargo capacity, 1500 tons; or 31,450 cubic feet; hopper capacity, 1170 cubic yards; bunker fuel oil capacity, 60 tons; speed, 9.15 knots, on trial trip.

MACHINERY PARTICULARS

Main Engines—Two, 4-cycle air injection, single acting, Winton diesel engines, each of 8 cylinders of 12 15/16-inch diameter and 18-inch stroke.

Boiler—One donkey boiler of the vertical fire tube type built by the Federal Shipbuilding & D. D. Co.; size, 4 feet ½ inch in diameter by 9 feet 3 inches high of 216 square feet heating surface; fuel oil.

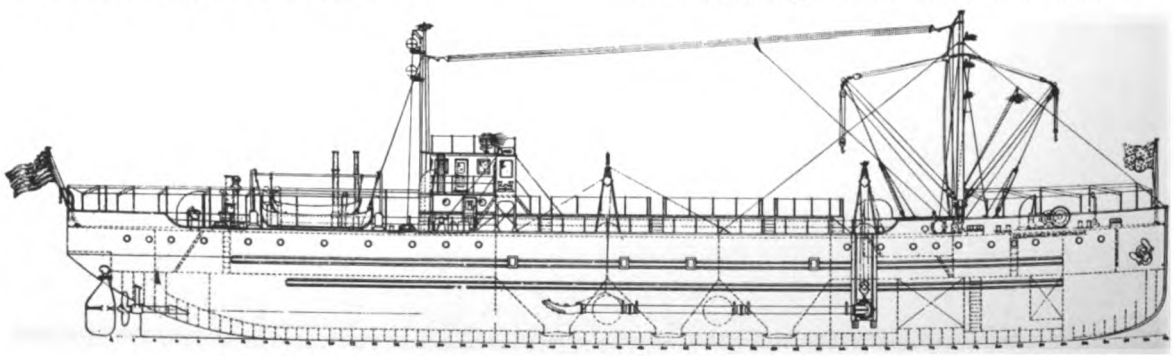
Auxiliary Engines—One 8-cylinder, 4-cycle air injection single acting 12 15/16 by 18 inches Winton diesel engine; one 4-cylinder Winton diesel engine 7½ by 11 inches.

AUXILIARY EQUIPMENT

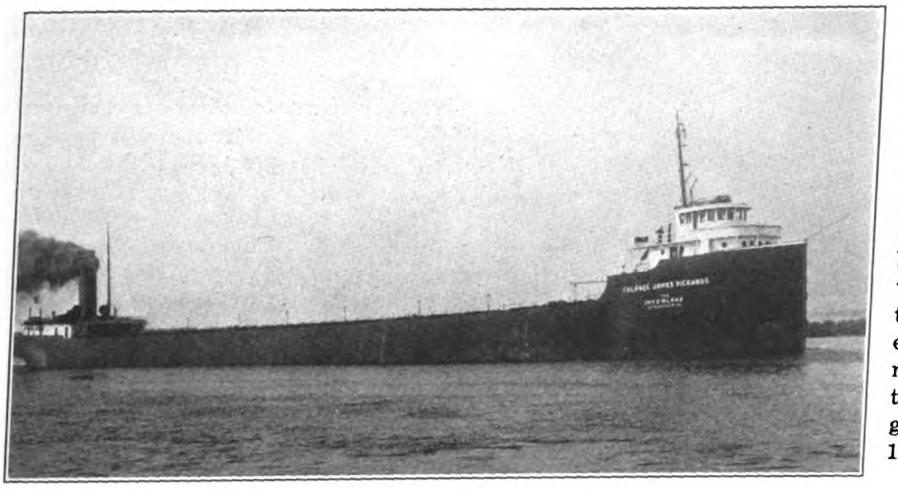
Manufacturers of:

Electric Generators—Westinghouse Electric & Mfg. Co.
Electric Motors—General Electric
Pumps—Worthington, Dunning and Northern
Dredging Pumps—Two, Federal S. B. Co.
Windlass—Hyde Windlass Co.
Capstan—Hyde Windlass Co.
Winches—Lidgerwood Mfg. Co.
Winches for Drag—Lidgerwood Mfg. Co.
Steering Engine—Hydro electric, Hyde
Refrigeration—Brunswick-Kroeschell Co.
Hopper Gear—Federal Shipbuilding & D. D. Co.

The hopper dredge WILLETS POINT has been designed with certain operating conditions in mind in order to give economy under such conditions. The waters in which this dredge is to operate definitely fixed the limits of her dimensions and draft. It will be possible for this dredge to pass through to the Great Lakes. Drags have been fitted on both sides pivoted at the sides forward of the hopper. The machinery and operating bridge is located aft. The question of stability has been carefully worked out to give a proper margin of safety in all possible conditions of loading. The construction of the vessel throughout is of steel and all framing and stiffening is substantial.



COL. JAMES PICKANDS—Freighter Great Lakes—Single Screw Steam



DESCRIPTION

This vessel is a typical, modern Great Lakes freighter of the standard type of construction. She can carry a large cargo of coal or ore and can be discharged in a very short period of time. Watertube boilers burning coal furnish steam to one triple expansion engine giving a speed of 12.5 miles per hour.

Name—COL. JAMES PICKANDS
Owner—Interlake Steamship Co.
Builder—The American Ship Building Co.
Naval Architect—A. W. Cross, Am. S. B. Co.
Launched—Jan. 16, 1926
Completed—April 14, 1926
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 600 feet; length between perpendiculars, 580 feet; breadth molded, 60 feet; depth molded, 32 feet; draft loaded, 20 feet; displacement loaded, 17,000 tons of 2000 pounds each; gross tonnage, 8151; net tonnage, 6442; cargo capacity, 12,000 short tons; cargo capacity, cubic feet, 546,116, bunker fuel capacity in tons of coal, 500; speed, 12.5 statute miles per hour.

MACHINERY PARTICULARS

Main Engine—1 triple expansion reciprocating steam engine built by the American Ship Building Co.; size, 24½ x 41 x 65 inches x 42-inch stroke; indicated horsepower, 2200.

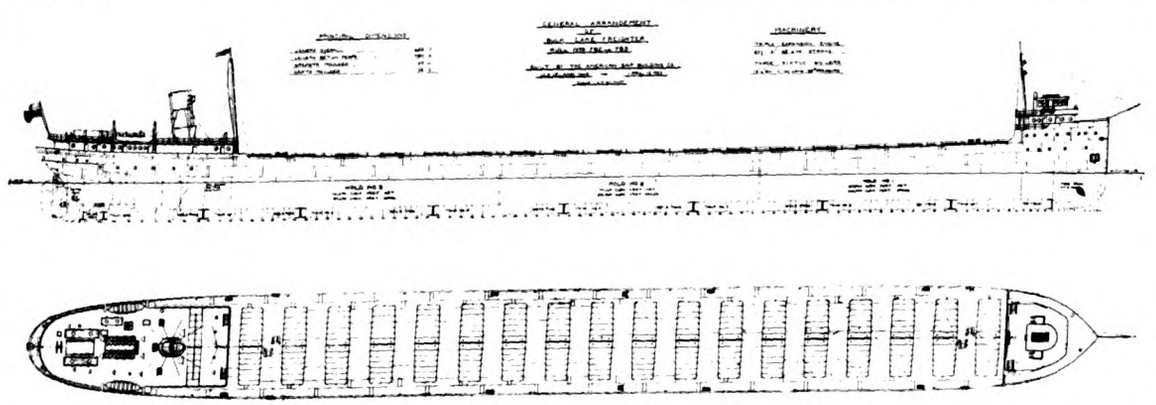
Boilers—Number 3; name of maker, Babcock & Wilcox Co.; type, watertube; coal burners, size, total heating surface, 7965 square feet; working pressure, 200 pounds per square inch; fuel, coal.

AUXILIARY EQUIPMENT

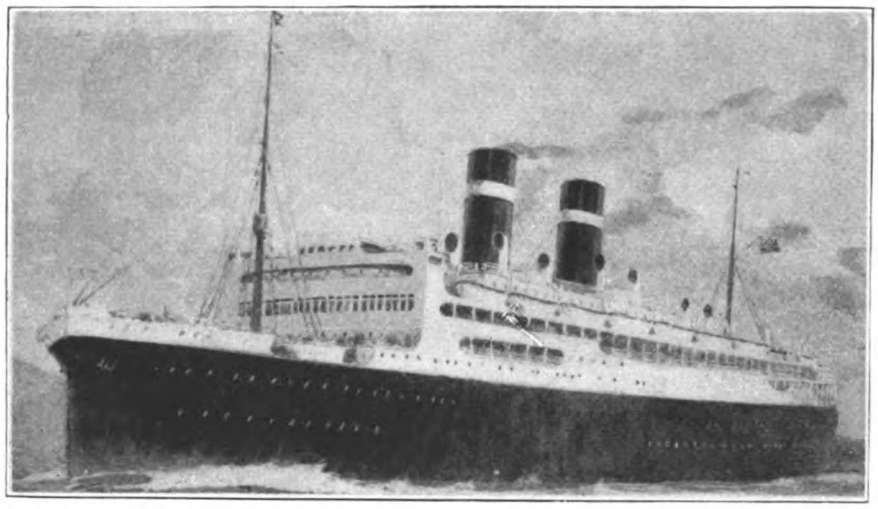
Manufacturers of:

Pumps—Warren Steam Pump Co. and Wheeler Condenser Co.
Windlasses—American Ship Building Co.
Winches—American Ship Building Co.
Steering Engine—American Ship Building Co.
Propeller—American Ship Building Co.
Refrigeration—Ohio Frick Co.
Superheaters—Babcock & Wilcox Co.
Electric Generator—Engberg El. & Mech. Wks.
Anchor Chain—National Malleable Co.

The COL. JAMES PICKANDS is in practically every respect typical of the more or less standardized type of Great Lakes bulk carrier. She has the usual triple expansion reciprocating steam engine. Steam, however, is supplied by three watertube boilers. Coal of course is used on grates in firing these boilers. The cargo capacity at a draft of 20 feet is 12,000 short tons. The hull structure of the ship and her engineering details are classed to the requirements of the American bureau of shipping. This ship has been in constant continuous operation throughout all of last year and has given good satisfaction in service. The vessel is the product of the American Ship Building Co.



[CALIFORNIA—Passenger Ocean Liner—Twin Screw Electric



Name—CALIFORNIA
Owner—Panama Pacific Line (I. M. M. Co.)
Builder—Newport News S. B. & D. D. Co.
Launched—Under Construction
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 601 feet 3 inches; length between perpendiculars, 574 feet; breadth molded, 80 feet; depth molded, 52 feet; draft, 32 feet 3 inches; displacement loaded, 30,300 tons; gross register tonnage, approximately 20,400; passenger capacity, first class, 384; intermediate class, 363; cargo capacity, 7800 tons; bunker fuel oil capacity in tons, 4750; speed 18 knots average.

MACHINERY PARTICULARS

Main Engine—Turbo-electric propulsive machinery to be supplied by the General Electric Co.; a twin screw installation with a total of 17,000 shaft horsepower at 120 revolutions per minute of the propellers. There will be two main generators and two D. C. propulsive motors, each direct-connected to a propeller. These electric motors will be double armature and will be 8500 shaft horsepower each at 120 revolutions per minute. The generators will be each of 5250-6600 kilowatts with exciters of 500 kilowatts.

Boilers—Twelve Babcock & Wilcox marine water tube boilers of a total heating surface of 55,176 square feet and 16,128 square feet of superheating surface; fuel, oil.

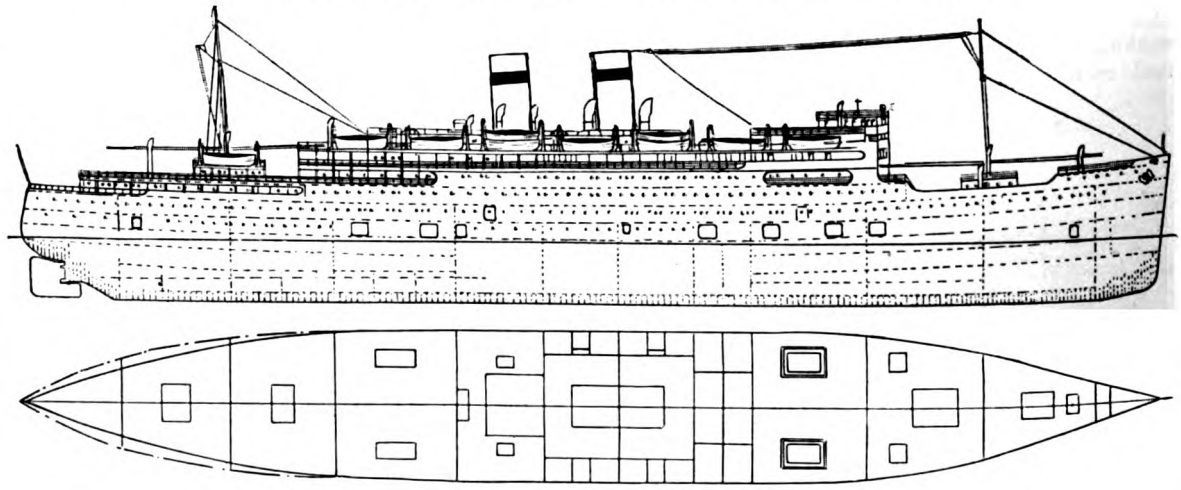
AUXILIARY EQUIPMENT

Manufacturers of:
Pumps—Warren Steam Pump Co.
Windlass—Hyde Windlass Co.
Winches—Hyde and Lidgerwood
Steering Engine—Hyde Windlass Co.
Refrigeration—Brunswick-Kroeschell Co.
Gyro Compass and Gyro Pilot—Sperry
Searchlight—Sperry Gyroscope Co.
Superheaters—Babcock & Wilcox Co.
Aux. Lighting—Matthews Engineering Co.
Electric Generators—General Electric Co.
Oil Burning Equipment—Peabody Eng. Corp.

Her design is based on the new "Minne" class liners of the Atlantic Transport line, the MINNEWASKA and MINNETONKA.

DESCRIPTION

The smart looking new ship pictured here is now under construction and will be completed in the fall of 1927 for service between New York and California. In every respect this liner will be comparable to the finest transatlantic ships now in service. She will be fitted with turbo-electric drive and will make a speed of 18 knots.



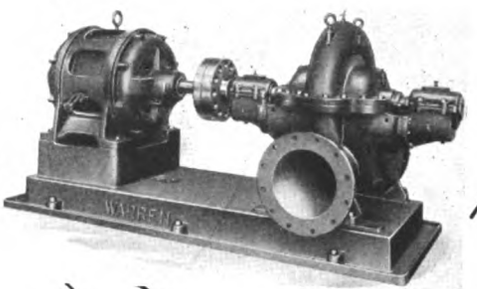
On the CALIFORNIA

From the small ice-water centrifugal pumps to the main condenser circulating pumps, Warren Centrifugals are employed throughout.

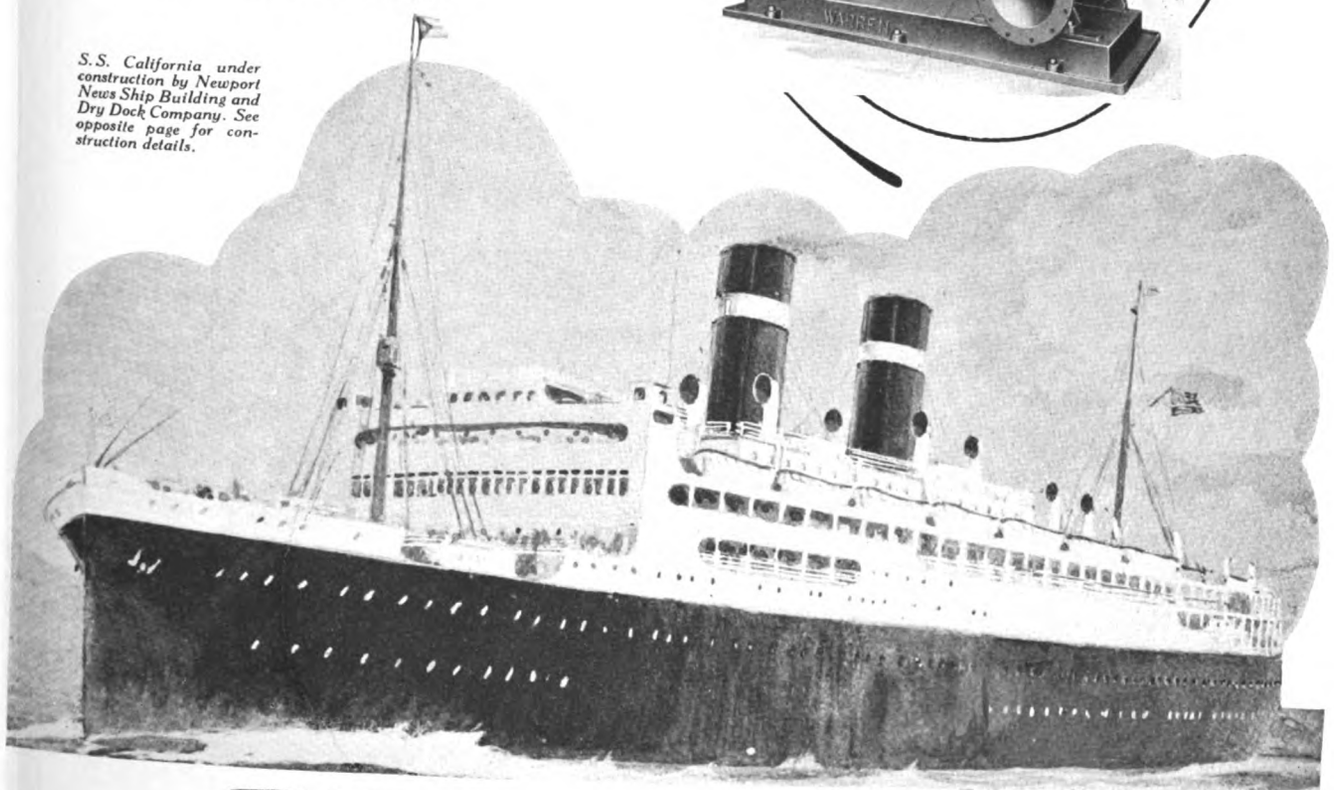
The selection of Warren Marine Pumps for the California is clearly in line with best practice as established by many of the finest ships in every class.

More and more, marine engineers agree that it pays to standardize on Warren Marine Pumps.

24 Warren Centrifugal Pumps



S.S. California under construction by Newport News Ship Building and Dry Dock Company. See opposite page for construction details.

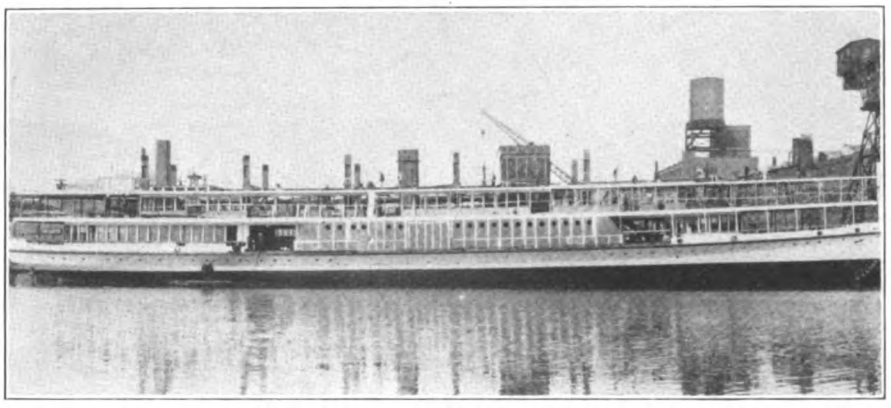


Warren

Warren Steam Pump Company, Inc., Warren, Mass.

Boston Philadelphia Chicago WARREN New York San Francisco

PETER STUYVESANT—Day Passenger—Single Screw Steam



Steamer PETER STUYVESANT *under construction—Taken March 9, 1927*

Name—PETER STUYVESANT
Owner—Hudson River Day Line
Builder—Pusey & Jones Corp.
Naval Architect—J. W. Millard & Bro.
Launched—Feb. 2, 1927
Classification—Day steamer, rivers.

HULL PARTICULARS

Length overall, 268 feet 6 inches; length between perpendiculars, 252 feet; breadth molded at main deck, 46 feet; over guards, 60 feet; depth molded to main deck at side of guard, 17 feet 3 inches; draft, 12 feet; not yet measured for gross and net tonnage; passenger capacity, 3500, including crew; bunker fuel capacity, 55 tons; speed, 20 miles per hour.

MACHINERY PARTICULARS

Main Engine—One inverted 4-cylinder triple expansion surface condensing steam engine; size, 25x40x47x47 inches x 36-inch stroke; built by Pusey & Jones Corp.

Boilers—Four Babcock & Wilcox marine water tube boilers; size, total heating surface, 9064 square feet; fuel, oil.

AUXILIARY EQUIPMENT

Manufacturers of:

Pumps—Warren Steam Pump Co.
Windlass—Hyde Windlass Co.
Steering Engine—Hyde Windlass Co.
Propeller—Pusey & Jones Corp.

DESCRIPTION

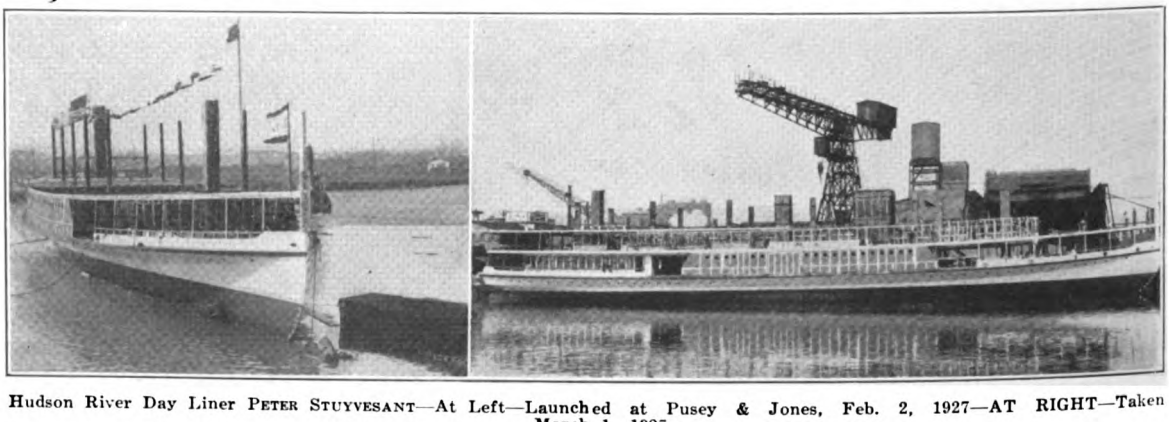
The experience of many years in the successful operation of day steamers on the Hudson river is incorporated in the design of this vessel. She will have the good proportions which make for beauty of lines characteristic of the best present boats.

Refrigeration—Frigidaire system
Oil Burning Equip.—Peabody Eng. Corp.
Electric Generator—Two 35 K. W. General Electric generators, driven by Terry steam turbines; one 15 K. W. General Electric aux. generator, driven by Engberg single engine on main deck.
Valves—Lunkenheimer Co.—Leslie Co.
Lighting & Int. Communications—Cory
Turbo Trim Pump—Kearfott Eng. Co.

This steamer was especially designed for day runs on the Hudson river for the Hudson River Day Line by J. W. Millard & Bro., naval architects of New York. The hull and main deck is of steel and there are three joiner decks above. There is also a lower deck of steel forward and aft of the boiler and machinery spaces.

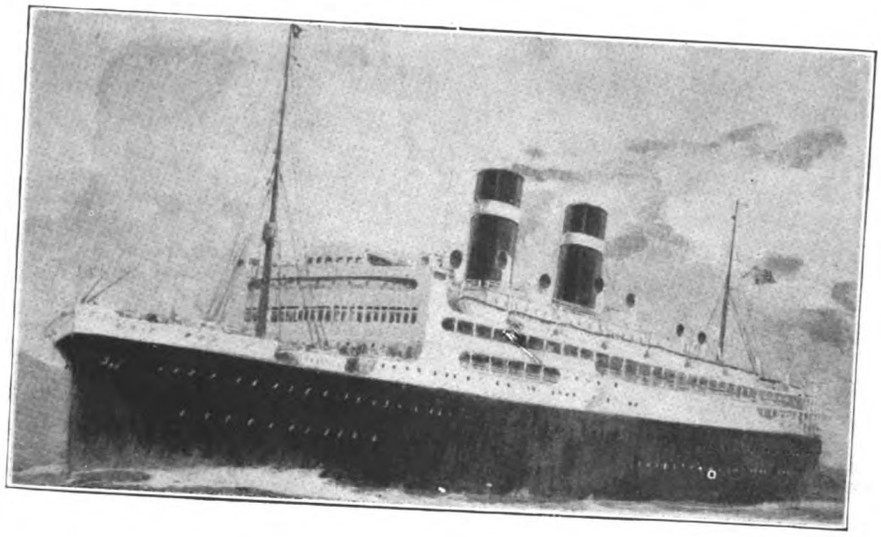
This vessel differs from other steamers of her class now in operation on the waters of the Hudson river and the vicinity of New York in that the enclosed spaces on the third deck are higher by 18 inches than the corresponding outer deck. An unobstructed view is thus given passengers inside, over the heads of those seated outside.

The carpeted saloon, eight private parlors and the writing room are located on the third deck instead of, as customary, on the second.



Hudson River Day Liner PETER STUYVESANT—At Left—Launched at Pusey & Jones, Feb. 2, 1927—AT RIGHT—Taken March 1, 1927

Peabody Burners



Another Peabody Installation

S. S. CALIFORNIA EQUIPPED WITH
48 PEABODY OIL BURNERS

Also the

NEW HUDSON RIVER DAY LINE STEAMER
PETER STUYVESANT

S. S. LEVIATHAN
Completing its 50th Voyage with Peabody Oil Burners

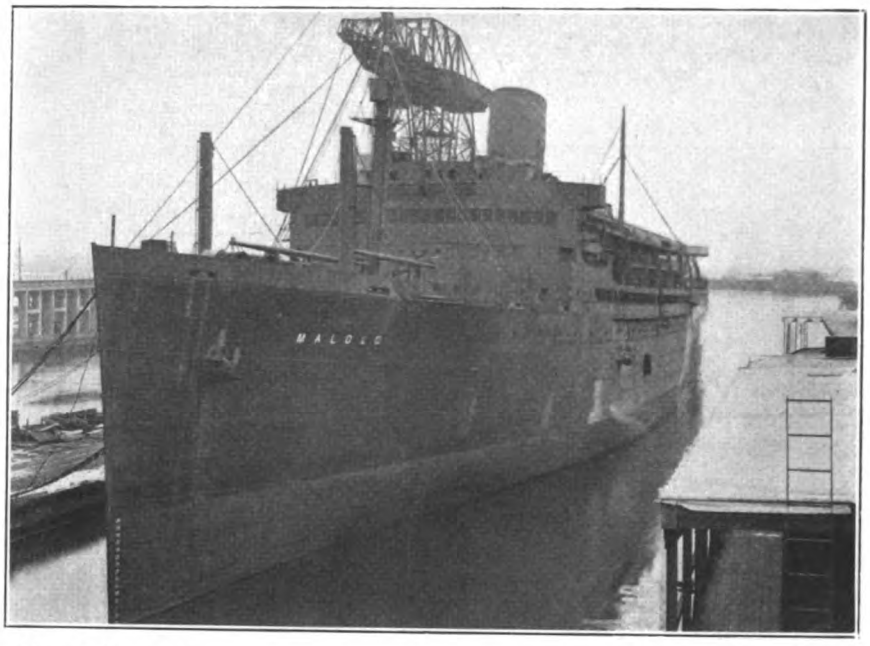
Pulverized Coal Burners
Completing their Second Successful Year
Under Water Tube Boilers

We will shortly announce the Peabody Combined Pulverized Coal and Oil Burner for installation under Scotch Marine Boilers.

Peabody Engineering Corp.

110 East Forty Second St., New York City

MALOLO—Passenger Ocean Liner—Twin Screw Steam



Name—MALOLO
Owner—Matson Navigation Co.
Builders—Wm. Cramp & Sons S. & E. B. Co.
Naval Architects—Gibbs Brothers Inc.
Launched—June 26, 1926
Completed—About May, 1927
Classification—American Bureau of Shipping and Lloyd's Register of Shipping

HULL PARTICULARS

Length over all, 582 feet; length between perpendiculars, approximately 554 feet, which is also approximately Lloyd's length; breadth molded, 83 feet; depth molded to C deck, 54 feet; draft designed, 26 feet; draft loaded, 28 feet 6 inches; displacement loaded, 19,560 tons; gross tonnage, about 17,200; net tonnage, about 7550; passenger capacity, about 653 first-class; deadweight, about 5500 tons at 26 feet draft and in cubic feet, dry cargo 227,000; refrigerated cargo, 18,600; stores, 21,100; fresh water, 2200 tons; salt water ballast capacity, 1040 tons; bunker capacity, 4590 tons of fuel oil; speed, 21 knots.

MACHINERY PARTICULARS

Main Engines—Two Parsons type steam single reduction, geared turbines built by Wm. Cramp & Sons Ship and Engine Building Co., each turbine, driving a single shaft, will have 12,500 shaft horsepower. Each set consists of one H.P., one first I. P., one second I. P., one L. P. and one cruising unit in series developing 12,500 horsepower. There is one H. P. element astern in the second I. P. and one L. P. astern in the L. P. unit.

Boilers—Twelve water tube marine type Babcock & Wilcox make, forced draft; total heating surface, 56,000 square feet; working pressure, 280 pounds; superheat, 100°F., fuel, oil.

DESCRIPTION

An ocean liner meeting the recommendations of the conference for safety at sea. Twin screws driven by geared turbines of great power will give a speed of 21½ knots. With spacious, comfortable and luxurious accommodations the MALOLO will be the equal of any transatlantic vessel. She will enter service between San Francisco and Hawaii early in June. The MALOLO will take less than four days between San Francisco and Honolulu.

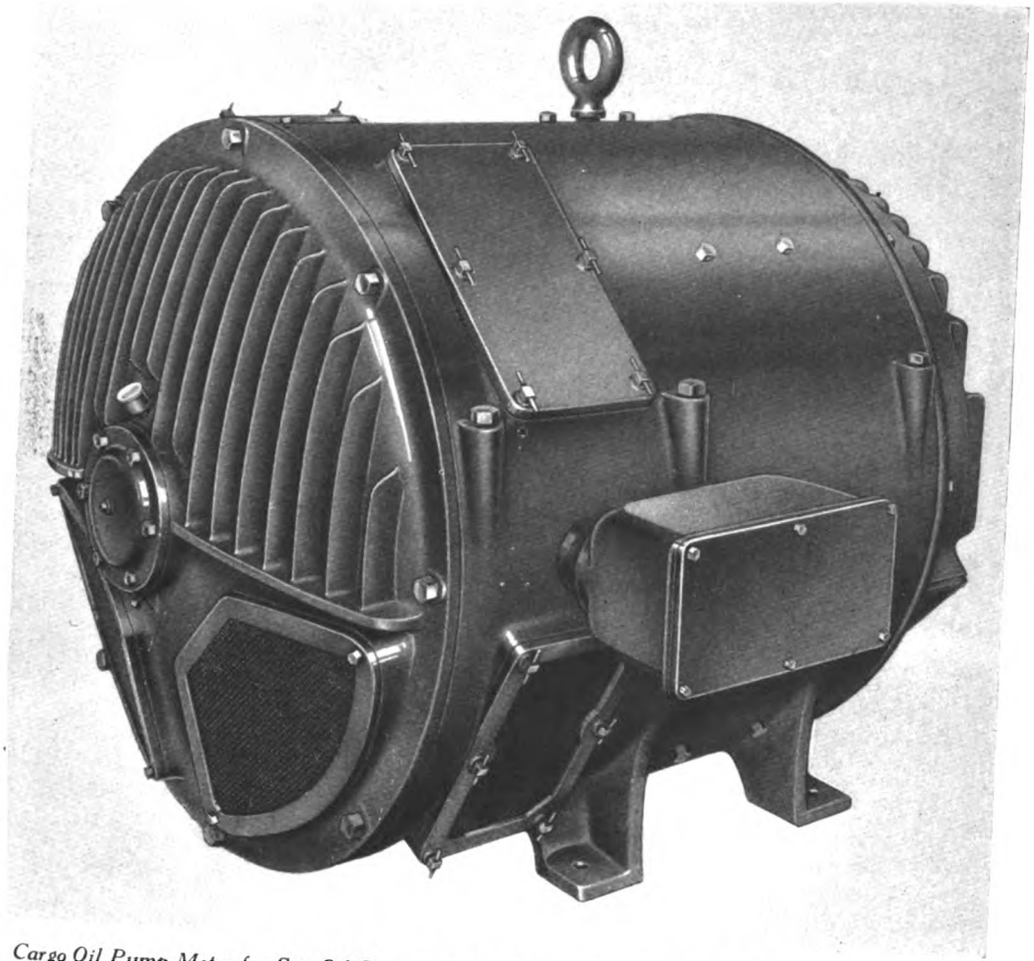
AUXILIARY EQUIPMENT

Manufacturers of:

Pumps—Worthington Pump & Mach. Corp.
Windlass—Hyde Windlass Co.
Cargo Winches—Hyde Windlass Co.
Boat Winches—Diehl Mfg. Co. & Lidgerwood
Steering Engine—Bethlehem S. B. Corp.
Anchor Chain—National Malleable Co.
Life Boats—Am. Brown Boveri Elec. Corp.
Propellers—Wm. Cramp & Sons S. & E. B. Co.
Reduction Gears—DeLaval Steam Turb. Co.
Refrigeration—J. & E. Hall Co., Ltd.
Valves—Crane, Lunkenheimer, Leslie
Oil Burning Equipment—Babcock & Wilcox
Superheaters—Babcock & Wilcox
Fire Detection—Rich System, Walter Kidde
Electric Generators—Westinghouse Electric.
Controls & Fire Alarms—Chas. Cory
Oil Purifiers—DeLaval Separator Co.
Turbines—B. F. Sturtevant Co.
Heaters—B. F. Sturtevant Co.
Fans—B. F. Sturtevant Co.
Radio Equip.—Radio Corp. of America.
Galley Equip.—Edison Elec. Appliance Co.
Gyro Compass & Gyro Pilot—Sperry
Searchlight—Sperry
Soot Blowers—Diamond Power
Evaporator—Griscom-Russell Co.
Feed Water Heaters—Griscom-Russell Co.
Deck Windows—Kearfott Engineering Co.

OTHER MATERIALS

Vehisote—The Pantasote Co. Inc.
Deck Covering—Marine Decking & Supply Co.
Flooring—Bonded Floors Co.



Cargo Oil Pump Motor for Sun Oil Company's Diesel Barge built by Sun Shipbuilding & Dry Dock Company, Chester, Pa.

Cargo Oil Pump Motor

Capacity: 50 H.P., 110 V., D.C., speed range 300/400 R.P.M. by field control. On test, motor developed 60 H.P. continuously without exceeding guaranteed temperatures.

Type: Marine, drip-proof, self-ventilated. Motor located in space not subject to explosive gases.

We supply motors with gas-tight frame if required for installation in space exposed to explosive gases.

Compact design for installation in crowded space. Frame divided horizontally so that armature and end covers can be lifted straight up without disturbing motor seating.

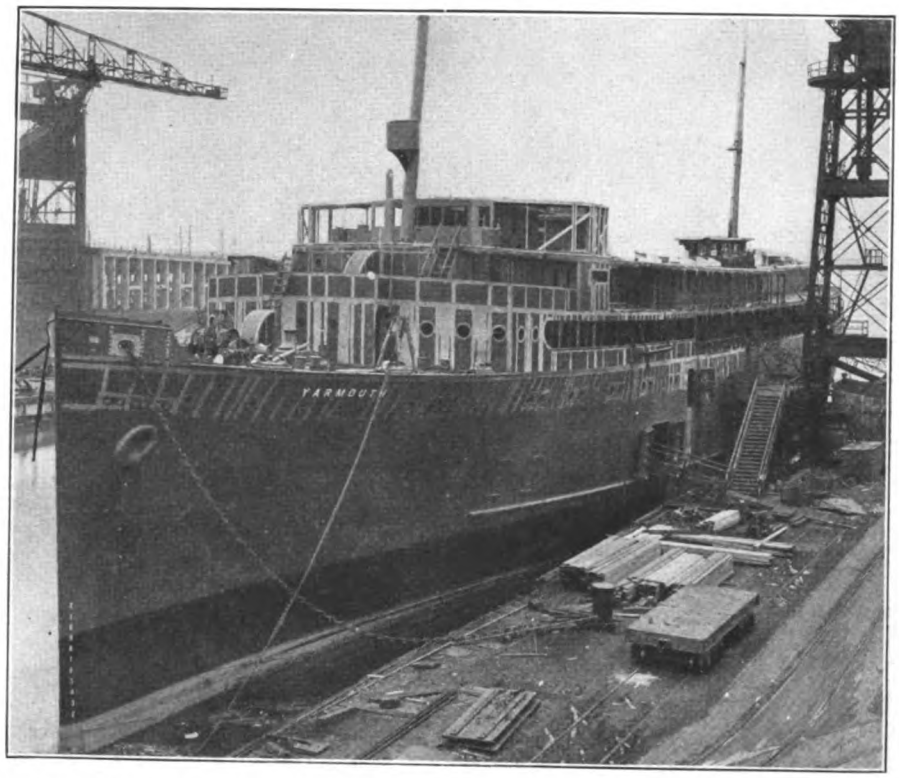
Watertight cast connection box for protection of incoming wire leads.

Double Timken roller bearings to withstand heavy pinion side thrust. Bearings enclosed, dust-proof.

Diehl Manufacturing Co. Elizabeth, N. J. U. S. A.

DIEHL

YARMOUTH—Passenger—Ocean—Twin Screw Steam



DESCRIPTION

An ocean ship for a coastwise trip, the twin screw, turbine driven, oil burning steamship, YARMOUTH and her sister ship the EVANGELINE will provide luxury, comfort and speed for passengers between New York and Boston and Yarmouth, N. S. There are five decks, with passenger accommodations on three upper decks. Two social halls, library, writing room, music room, dancing saloon, smoking room and veranda cafe are laid out with a view to comfort and are to be decorated in simple attractive style.

Name—YARMOUTH; sister ship, EVANGELINE
Owner—Eastern Steamship Corp.
Builder—Wm. Cramp & Sons S. & E. B. Co.
Naval Architect—Theodore E. Ferris
Launched—YARMOUTH, Nov. 6, 1926; EVANGELINE, Feb. 12, 1927
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 379 feet 3 inches; length between perpendiculars, 365 feet; breadth molded, 55 feet 6 inches; depth molded, 29 feet 6 inches; draft designed, 18 feet, maximum, 20 feet; displacement loaded, at 18 feet, 5905 tons; gross tonnage, about 4800; net tonnage, about 2700; passenger capacity, first class, 589; berth travel, 162; cargo capacity at 18 feet draft, about 550 tons, at 20 feet draft, about 1400 tons; cargo capacity in cubic feet, 95,420; bunker fuel capacity in tons, oil, 991; speed, 18 knots.

MACHINERY PARTICULARS

Main Engines—Two sets of cross compound, single reduction geared, turbines of Parson's type. The turbines are being built by Cramps. The reduction gears are being built by the DeLaval Steam Turbine Co. Size, each set consists of one high pressure and one low pressure unit with an astern unit in each low pressure; the shaft horsepower for each set is 3750.

Boilers—Six, scotch type, single ended, with four furnaces to each boiler, built by Cramps; size, 16 feet 4 inches in diameter by 11 feet 6 inches in length; working pressure, 210 pounds per square inch; fuel, oil burning.

AUXILIARY EQUIPMENT

Manufacturers of:
Pumps—Morris Mach. Wks.; Worthington
Windlass—American Engineering Co.
Winches—American Engineering Co.
Steering Engine—American Engineering Co.
Propellers—Two—Cramps—Three-bladed solid, 12 feet 6 inches diameter by 13 feet pitch
Refrigeration—Three, 8-ton Brunswick-Kroeschell
Oil Burning Equip.—Bethlehem-Dahl
Electric Generators—Three, 75 k. w. General Electric
Fire Alarm—Chas. Cory & Son
Electric Controls—Cutler-Hammer
Life Boats—American Brown Boveri
Ventilation Fans—B. F. Sturtevant Co.
Oil Purifiers—DeLaval Separator Co.
Radio Equip.—Radio corporation
Fire Detection—Rich System
Aux. Lighting—Matthews Engineering Co.

The YARMOUTH will give liner service between Boston and Yarmouth, N. S. The EVANGELINE will provide similar service between New York and Yarmouth and will establish in that run a thirty-three hour schedule for the trip by connecting at Yarmouth with special trains for Halifax. It is the policy of the company in this case to provide an ocean ship for a coastwise trip.

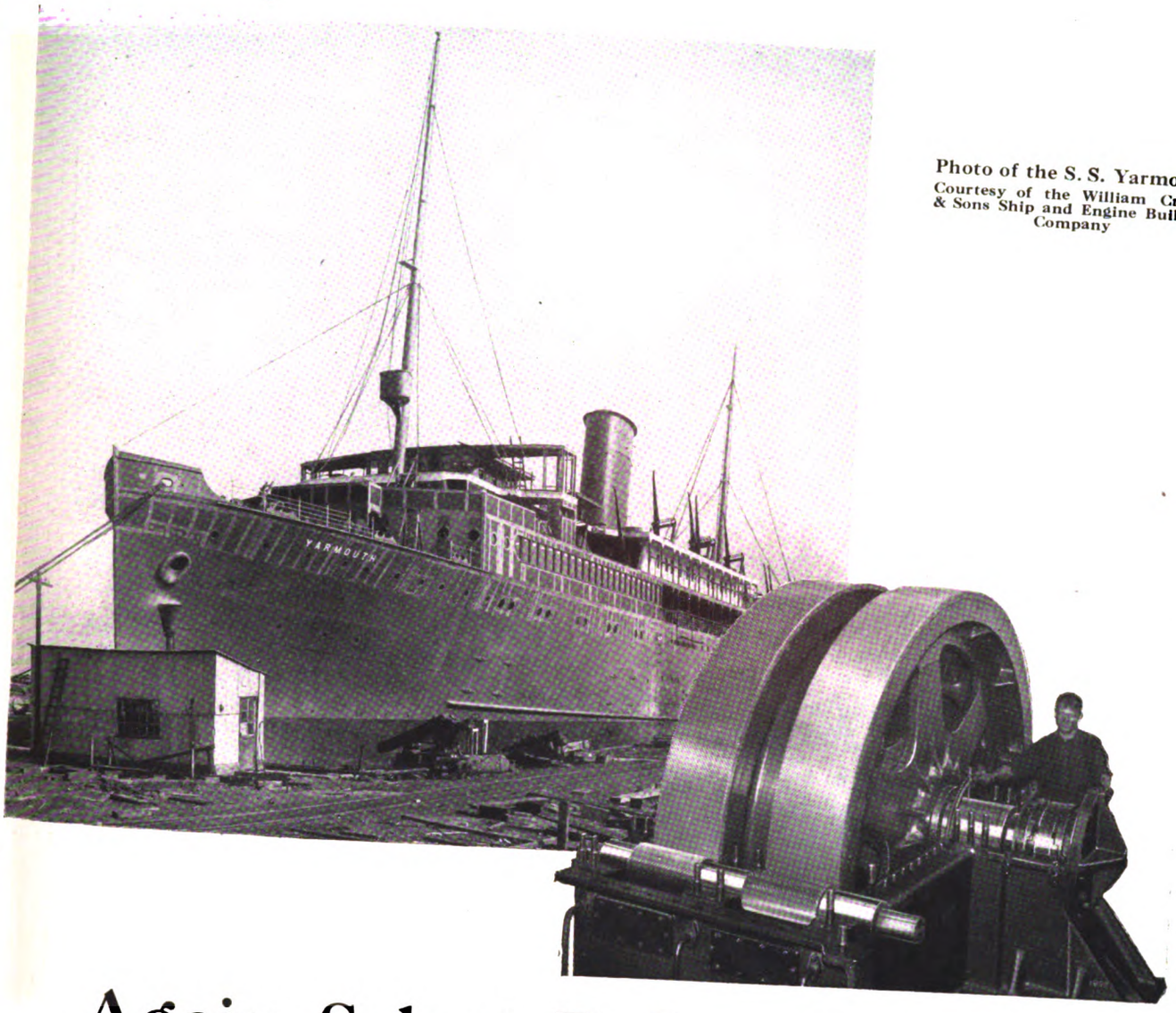


Photo of the S. S. Yarmouth
Courtesy of the William Cramp & Sons Ship and Engine Building Company

Again Select DeLaval Gears

SOME three years ago, the Eastern Steamship Lines, Inc., placed in service between New York and Boston, two high class twin-screw passenger vessels, the "Boston" and the "New York". Each vessel was driven by two compound turbines of 3800 HP. each, through De Laval two pinion, double helical speed reducing gears.

The reduction gears installed on the "New York" and "Boston" have proven entirely satisfactory, as shown by the fact that the "Yarmouth" and the "Evangeline", now being built by the Wm. Cramp & Sons Ship & Engine Building Company for the Eastern Steamship Company, are equipped with De Laval gears. These vessels are twin screw vessels requiring 3800 shaft horse power for each screw.

Similarly, satisfactory service has led the Southern Pacific Company to install De Laval turbines and gears in succession on the steamships "El Coston" (ex "Bien Ville") of 7100 HP., "El Oceano" of 6000 HP., and on a third vessel the "S.S. Dixie" now being built at the Federal Ship Building Company's yards, which is to be equipped with a De Laval compound turbine, operating on steam at 350 lbs. gage pressure and 150° superheat and developing 8000 HP., when driving the propeller at 90 RPM through De Laval double reduction gears. It is expected that this ship will operate on less than .75 pounds of oil per shaft horse power.

When weight, fuel and all other operating expenses are taken into consideration along with reliability and flexibility of control, the De Laval Geared Marine Turbine stands foremost among prime movers for marine service.

Submit data, and our engineers will gladly supply estimates.

De Laval Steam Turbine Co.

Trenton, New Jersey

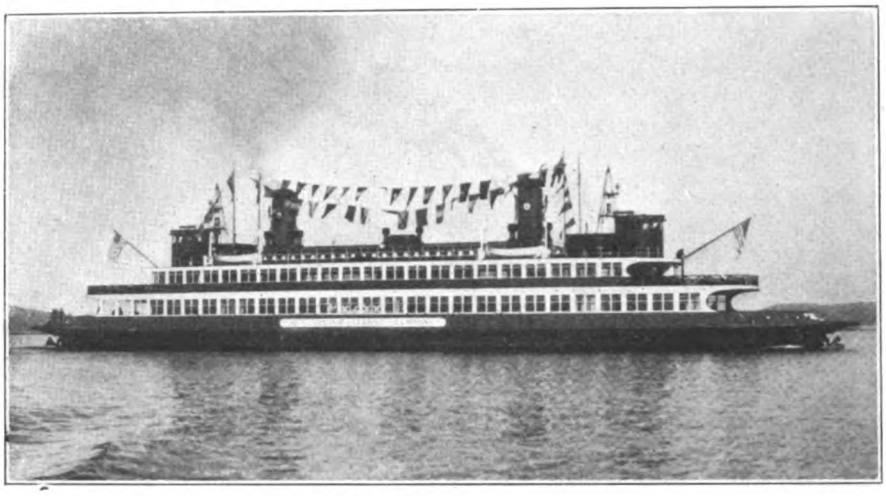
LOCAL OFFICES

Atlanta, Boston, Charlotte, Chicago, Cleveland, Denver, Duluth, Havana, Helena, Honolulu, Houston, Indianapolis, Kansas City, Los Angeles, Montreal, New York, New Orleans, Philadelphia, Pittsburgh, Portland, Ore., St. Paul, Salt Lake City, San Francisco, Seattle, Spokane, Toronto, Vancouver

649

Manufacturers of Steam Turbines, Centrifugal Pumps, Centrifugal Blowers and Compressors, Double Helical Speed Reducing Gears, Worm Gears, Hydraulic Turbines, Flexible Couplings and Special Centrifugal Machinery

PERALTA—Passenger Ferry—Double Ended—Turbo-Electric



DESCRIPTION

It is interesting to know that the turbo-electric form of propulsion was chosen for these two fine ferry-boats on account of its inherent reliability as demonstrated to the satisfaction of the public and the owner for a period of two years. Similar satisfactory performance is expected from these new boats.

Name—PERALTA and YERBA BUENA
Owner—Key System Transit Co., Oakland
Builder—Moore Dry Dock Co.
Naval Architects—Hibbs, McCauley & Smith
Launched—Both vessels, fall 1926
Completed—PERALTA, March, 1927; YERBA BUENA, April, 1927
Classification—Highest in American Bureau

HULL PARTICULARS

Length overall, 276 feet; length between perpendiculars, 256 feet; breadth molded, 47 feet, over guards, 70 feet; depth molded, 21 feet; draft normal load, keel, 14 feet 9½ inches; displacement loaded, 2100 tons; passenger capacity, 4000; deadweight capacity, 261 tons; normal fuel oil capacity, 228 tons; speed 15.23 knots.

MACHINERY PARTICULARS

Main Engine—One Westinghouse Elec. & Mfg. Co. turbine of 3600 horsepower.

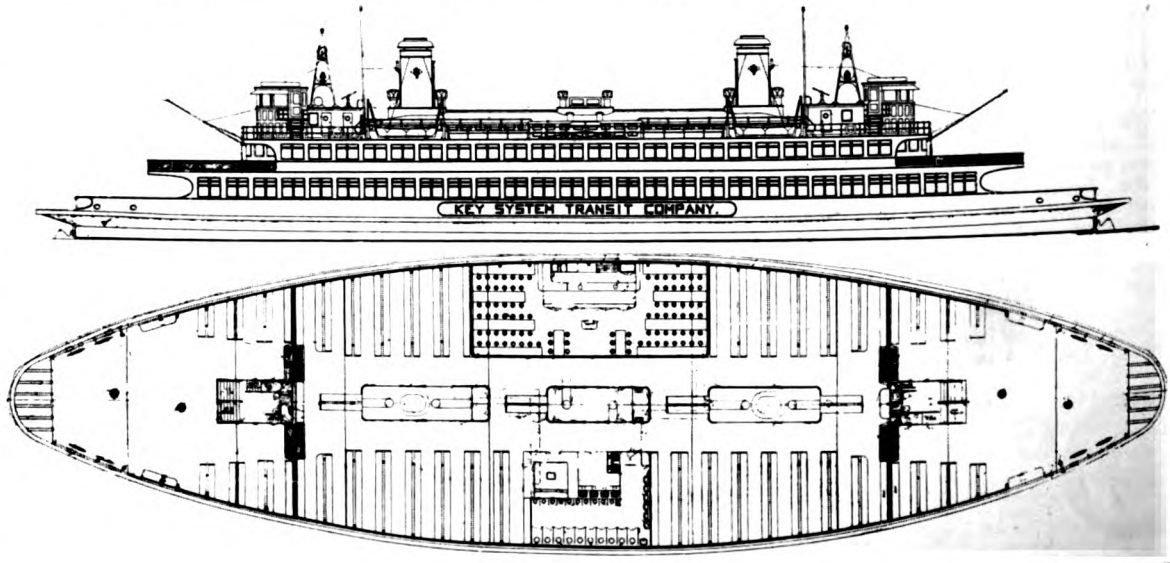
Main Generator—One Westinghouse direct current generator, geared to main turbine, of 1900 kilowatts, at 514 revolutions per minute; one exciter of 200 kilowatts.

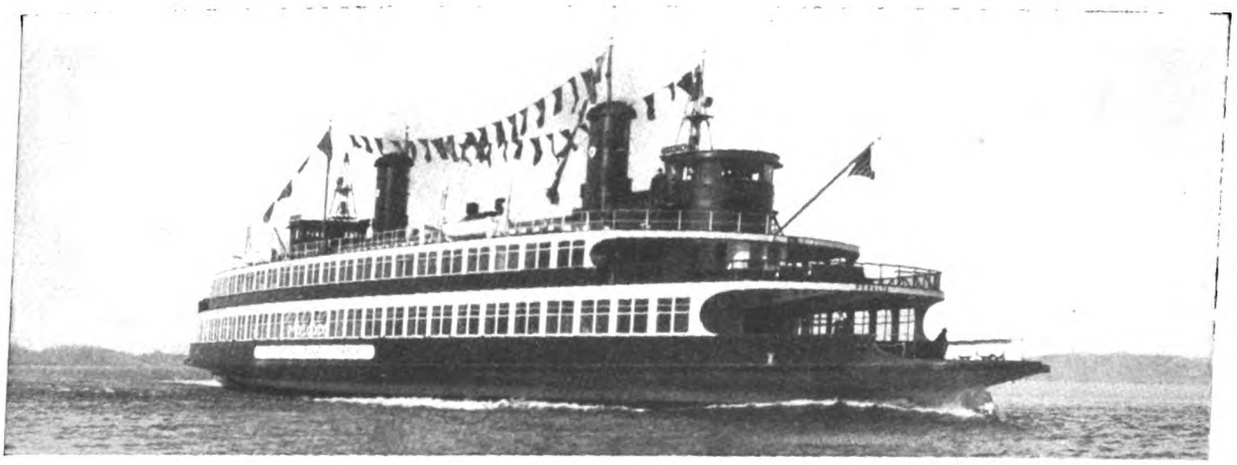
Motors—Two Westinghouse double armature direct current propelling motors at 2250 horsepower total at 212 revolutions per minute.

Boilers—Four Babcock & Wilcox water tube marine boilers of 2837 square feet heating surface each; superheat 100 degrees; fuel, oil.

AUXILIARY EQUIPMENT

Manufacturers of:
Oil Burning Equipment—Babcock & Wilcox
Superheaters—Babcock & Wilcox
Electric Generators—Westinghouse Elec. Co.
Pumps—Worthington Pump & Mach. Corp.
Windlass—Moore Dry Dock Co.
Steering Engine—Hyde Windlass Co.
Propellers—Am. Brown Boveri Elec. Corp.
Refrigeration—Frigidaire Co.
Valves—Lunkenheimer Co.
Soot Blowers—Diamond Power Specialty
Engine Controls, Lighting & Bells—Cory
Tailshaft Lub.—Beth. McNab Vista
Framing—Isherwood





Key System Ferries
Peralta and
Yerba Buena

Westinghouse Powered

World's Largest Electric Ferries

A NEW and high standard in ferry boat engineering has been achieved in the Key System Transit Company's ferry boats "Peralta" and "Yerba Buena".

Speed, maneuvering ability, and economy were all demanded from the power plant. Smooth operation, insuring the maximum comfort for the passengers, was also a big factor.

To attain these results, Westinghouse turbine-electric equipment was chosen for all propulsion and Westinghouse motors for all equipment

The broad scope of Westinghouse experience in marine electrification insures a correct solution of the many difficult situations that arise in marine engineering. Our nearest branch office will gladly confer on any specifications no matter how large or how small.

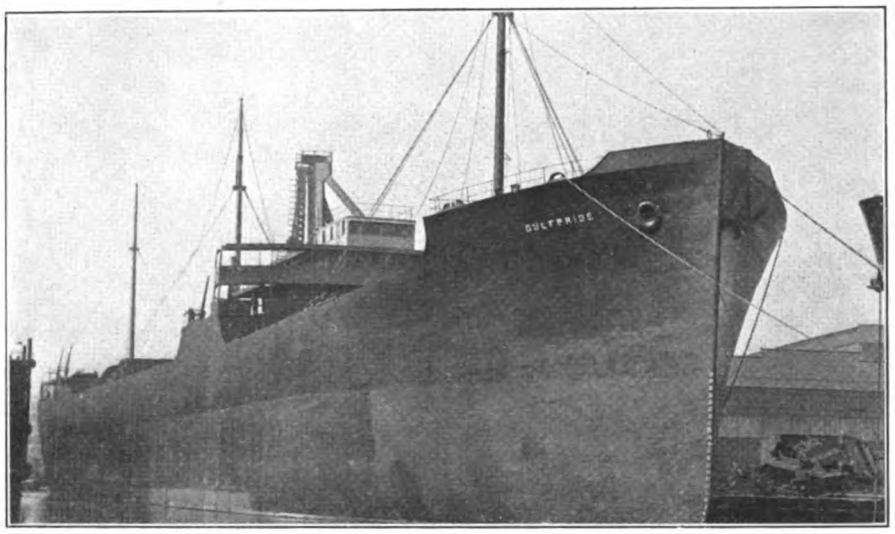
Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

Sales Offices in All Principal Cities of
the United States and Foreign Countries

Westinghouse

X91112

GULFPRIDE—Tanker—Ocean—Twin Screw Diesel



DESCRIPTION

A twin screw diesel tanker of 17,400 tons deadweight the GULFPRIDE is in every respect one of the most modern vessels of her type afloat. She is the first vessel built in the United States on the new Isherwood bracketless system of hull construction, and is also the largest so far built on this system in the world. She is owned and will be operated by the Gulf Refining Co.

Name—GULFPRIDE
Owner—Gulf Refining Co.
Builder—Federal Shipbuilding & D. D. Co.
Naval Architect—John C. Craven
Launched—Jan. 20, 1927
Completed—March 30, 1927
Classification—Lloyds & American Bureau

HULL PARTICULARS

Length overall, 543 feet; length between perpendiculars, 525 feet; breadth molded, 74 feet; depth molded to shelter deck, 40 feet 6 inches; draft loaded, 28 feet; displacement loaded, 21,480 tons; gross tonnage, about 12,500; net tonnage, about 8500; cargo capacity, 16,700 tons, in cubic feet, 827,000; bunker fuel capacity in tons, 900; speed, 11 knots.

MACHINERY PARTICULARS

Main Engines—Two, 4-cylinder 2-cycle, single acting Bethlehem diesel engines; size, 26 inches diameter of cylinders, and 48-inch stroke, giving 2000 shaft horsepower for each engine; builder, Bethlehem Steel Co.

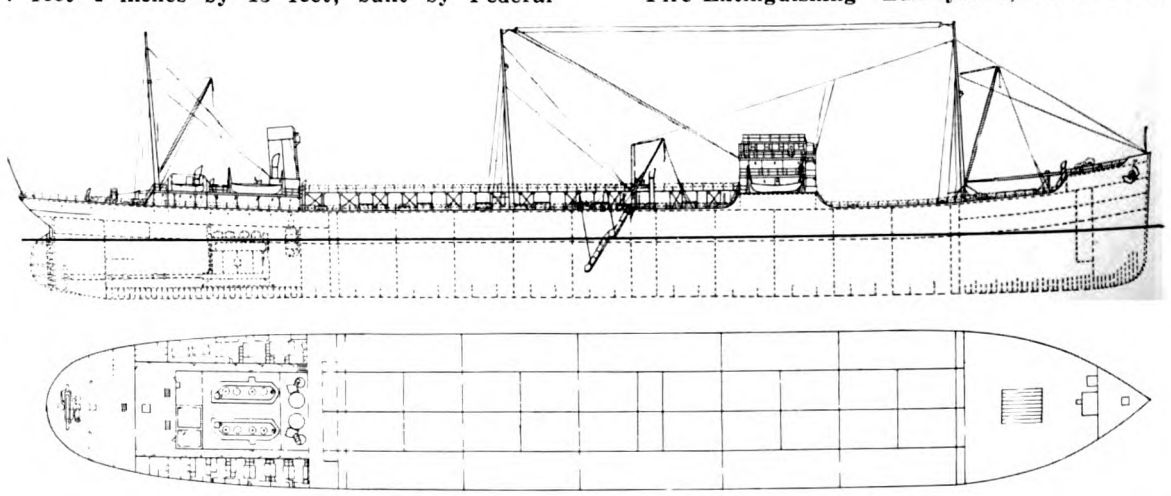
Boilers—Two, of vertical fire tube type; size, 7 feet 4 inches by 13 feet; built by Federal Shipbuilding & Dry Dock Co.; fuel, oil.

Auxiliary Engines—Three, each of 150 brake horsepower diesel engines direct-connected to a 100-kilowatt electric generator; these engines are of the Nelseco type built by New London Ship & Engine Co.; the generators were furnished by the Westinghouse Electric & Mfg. Co.

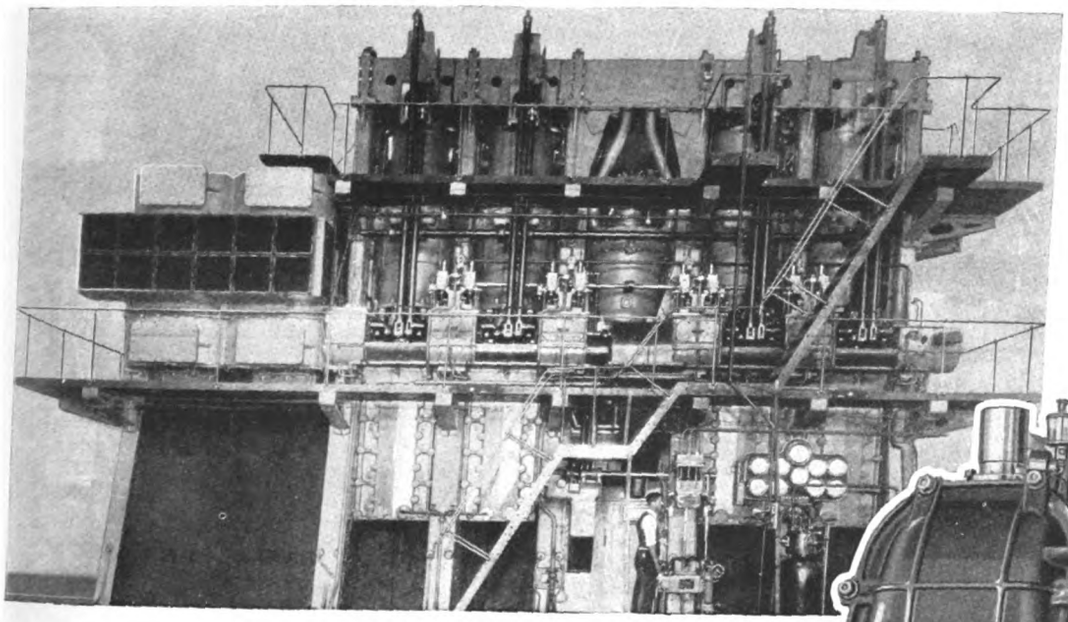
AUXILIARY EQUIPMENT

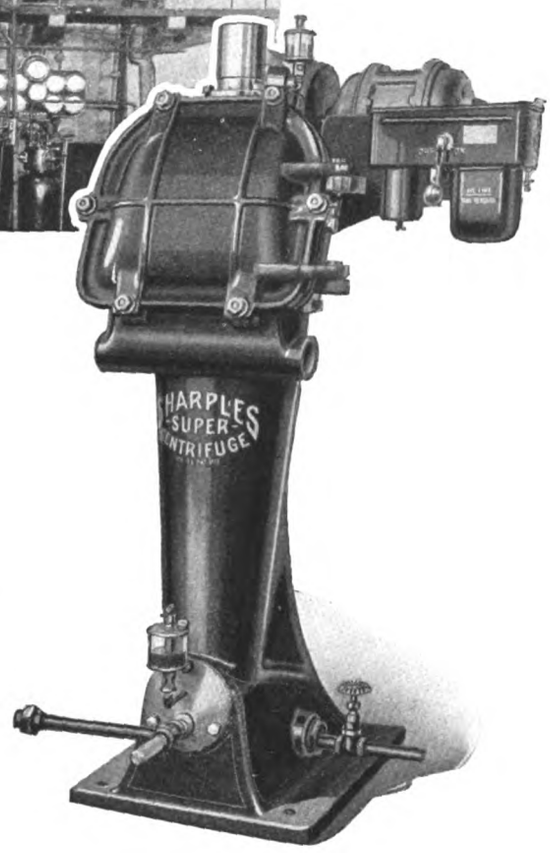
Manufacturers of:

Pumps—Worthington; Cameron; and Northern Rotary; electric driven, motors furnished by Westinghouse
Windlass—Hyde Windlass Co.
Winches—Hyde Windlass Co.
Steering Engine—Hyde Windlass Co.
Refrigeration—Brunswick-Kroeschell Co.
Oil Burning Equip.—Peabody Eng. Corp.
Telegraphs & Controls—Chas. Cory
Gyro Compass & Pilot—Sperry Gyroscope Co.
Electric Controls—Cutler-Hammer
Oil Purifiers—Sharples Specialty Co.
Radio Equipment—Radio Corporation
Fire Extinguishing—Lux system, Walter Kidde



3 SHARPLES OIL PURIFIERS in 30-Day Government Test





on

HAMILTON M.A.N. 3300 S.H.P. DIESEL

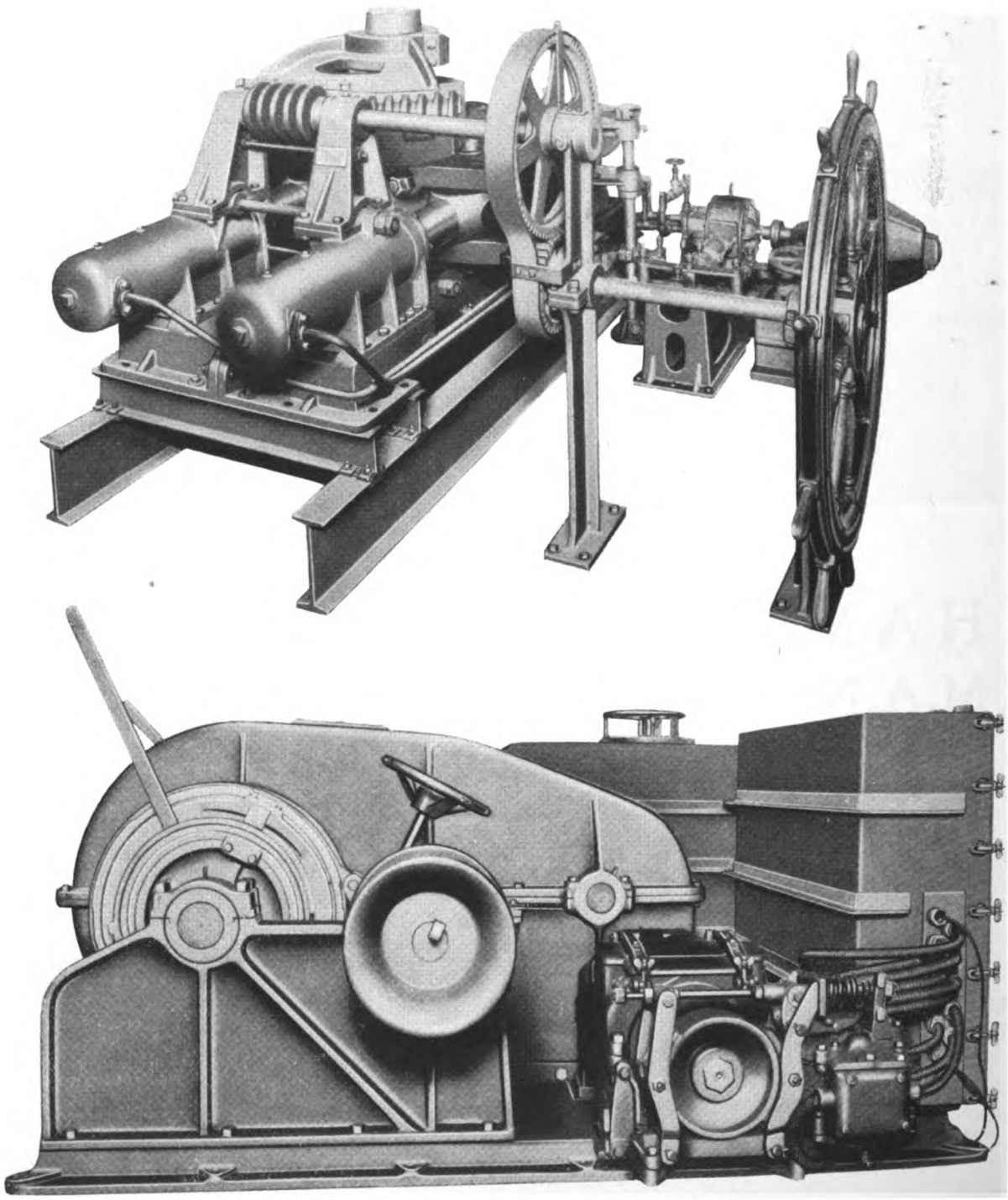
During the 30-day full-load Government Test of the Hamilton M. A. N. 3300 s. h. p. double-acting Diesel Engine for the U. S. Shipping Board, three Sharples Oil Purifiers were used to clean the fuel and lubricating oil.

The Hooven, Owens, Rentschler Co., of Hamilton, Ohio—builders of this great engine—wisely safeguarded against shut-downs through impurities in the fuel and lubricating oils during this important test by installing Sharples Super Centrifuges for rapid and positive purification.

THE SHARPLES SPECIALTY COMPANY, 2338 WESTMORELAND STREET, PHILADELPHIA. Boston, New York, Pittsburgh, Chicago, Detroit, Tulsa, New Orleans, San Francisco, Los Angeles, Seattle, Toronto. Super Centrifugal Engineers, Ltd., Aldwych House, London, W. C. 2, England; Ste. Ame des Appareils Centrifuge, 8 Rue du Helder, Paris, France; Tatsumi Commercial Corporation, Marine Insurance Building, Tokio, Japan.

SHARPLES
A GREAT FORCE

When "NORTHLAND"



American Engineering

"Leaders in the Marine

D" Sails Into The Arctic

its safety will depend upon American Engineering Company equipment.

THE steering gear and windlass on this new coast guard cutter are constructed to stand the shock of heavy seas. The NORTHLAND is also equipped with an American Engineering Company warping gypsey of special design and rugged construction.

The steering gear has double plungers and cylinders with hydraulic pressure supplied by a Hele-Shaw Pump. The gear is very rugged and is constructed to give maximum leverage as the rudder approaches the hardover position.

The main tiller is loose on the rudder stock with the power transmitted to the locking head, which is keyed to the rudder stock through two shearing pins on opposite sides of the stock so as to avoid any side pressure on the rudder stock bearings. The shear pins protect the mechanical parts of the gear when ice is jammed around the rudder.

All parts are mounted on a common bed plate which also forms a bearing for the rudder stock.

Two large wood hand wheels with spur and worm gearing with a self-locking worm are provided for hand operation. Control from the pilot house is with flexible cables with Hanscom wire rope drums.

The windlass has a watertight casing that protects the gearing and electrical equipment, which are mounted on a common bed plate. The gearing is of spur type, all gears are cast steel, and all pinions forged steel, with cut teeth.

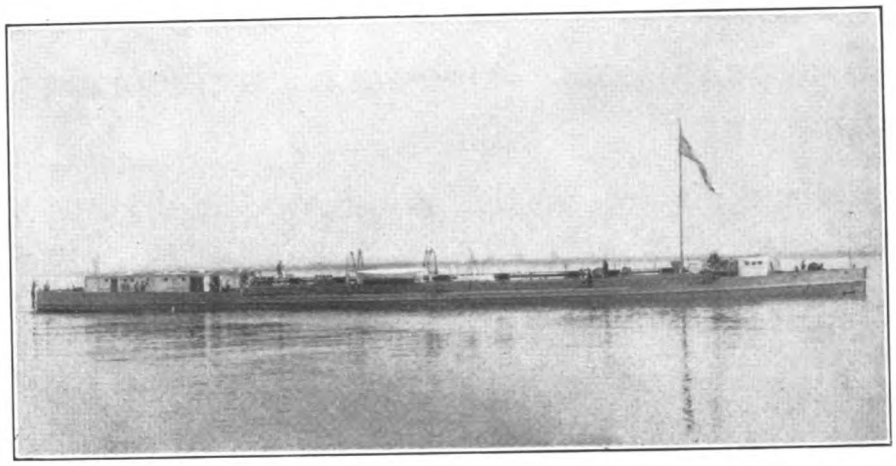
A-E-CO AUXILIARIES are backed by seventy years of leadership in the manufacture of fine machinery for ships.

Whether you want a motorboat windlass or a battleship's steering gear, write us.

Company--- **Kensington Station**
Philadelphia---Pa.

Field - - - - - since 1857"

SUNOCO—Twin Screw—Tanker—Direct Drive Diesel



DESCRIPTION

A low superstructure steel tanker for carrying oil in bulk on rivers, harbors and through the barge canal to the Great Lakes. Designed to carry a maximum load for its dimensions on the extreme draft permissible through the canal. The vessel is thoroughly subdivided into tanks, equipped for any grade oil.

Name—SUNOCO
Owner—Sun Oil Co., Phila.
Builder—Sun Shipbuilding & Drydock Co.
Naval Architect—John W. Hudson
Completed—1926
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 253 feet 6 inches; length between perpendiculars, 245 feet 6 inches; breadth molded, 40 feet; depth molded, 15 feet to main deck, 18 feet to top of expansion trunk; draft designed, 12 feet; displacement loaded, 2650 tons; gross tonnage, 1213; net tonnage, 738; cargo capacity, 15,500 barrels of oil; cargo capacity in cubic feet, 86,900; deadweight in tons, 1825 on 12 feet draft; full capacity, 2250 tons at 38.5 cubic feet per ton; speed, 10 knots.

MACHINERY PARTICULARS

Main Engines—Two heavy oil engines built by Bessemer Gas Engine Co.; six cylinder 4-cycle; 11½-inch bore and 16-inch stroke; each engine of 360 brake horsepower.

Boiler—One auxiliary heated by exhaust gases and fitted for burning oil; built by Sun Shipbuilding & Drydock Co.; of locomotive type with 377 square feet of heating surface.

Auxiliary Engines—Two heavy oil engines built by the Bessemer Gas Engine Co. of four cylinders 7½ x 10 inches.

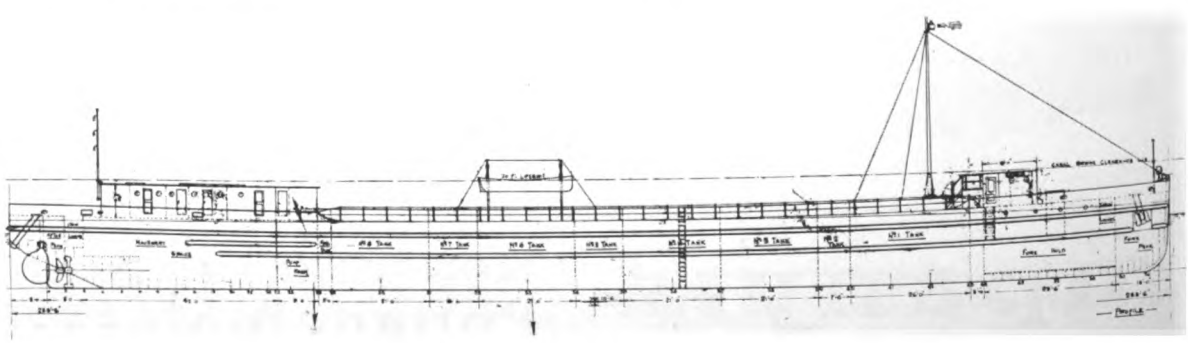
AUXILIARY EQUIPMENT

Manufacturers of:

Pumps—Worthington Pump & Mach. Corp.
Windlass—American Engineering Co.
Winches—American Engineering Co.
Steering Engine—Hyde Windlass Co.
Propellers—Sun Shipbuilding & D. D. Co.
Refrigeration—Brunswick-Kroeschell
Oil Burning Equip.—Ray
Electric Generators & Motors—Diehl
Framing—Isherwood System
Steering Control & Helm Indicator—Sperry
Silencers—Maxim Silencer Co.
Control Apparatus—Cutler-Hammer Mfg. Co.
Oil Purifier—De Laval Separator Co.

The SUNOCO was designed for operation coastwise, harbors, rivers and canal for carrying oil in bulk from refinery to delivery stations as for instance from Chester, Pa. to New York harbor, barge canal and Great Lakes. The motive power is twin screw diesel direct drive with machinery aft.

There are eight tanks and the pump room is located aft. She is built on the Isherwood longitudinal system. Accommodations for deck officers and the wheel house are forward while the engineers and crew have quarters in the deckhouse aft.



Distinctive oil, too—

Clean oil furnished by De Laval Oil Purifiers protects the Diesel engines or turbines of at least nine of the distinctive ships described in this issue of Marine Review.

The De Laval Oil Purifier (regular type) constantly maintains the lubricating efficiency of oil and makes it possible to keep the same oil in service indefinitely. It minimizes the cost of lubrication, while improving the service rendered by the oil.

It insures continuous operation of the engine while guarding against damage resulting from insufficient or improper lubrication.

Study of the engine room equipment of Diesel ships recently built or converted proves that marine engineers now consider centrifugal purification of fuel quite as important as the purification of lubricating oil. The De Laval Vapor-Tight Fuel Oil Purifier is built especially for this service, in two distinct types.

Clean fuel oil minimizes wear on cylinder liners, injection feed nozzles, and fuel pumps, and removes the trouble attending the burning of oil containing water. Regardless of its previous condition, oil which comes from the De Laval Purifier is *clean*.

Write today for full details as to how De Laval Oil Purifiers will quickly pay for themselves on your ship, asking especially for Bulletin 106—

Some distinctive ships equipped with De Laval Oil Purifiers:

Malolo	Evangeline
California	Caracas
Steel Chemist	Hull No. 89
Yarmouth	Sunoco
Northland	

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 600 Jackson Blvd., Chicago
DE LAVAL PACIFIC COMPANY, San Francisco
ALFA-LAVAL COMPANY, Ltd., 34 Grosvenor Road, London, S. W. 1

De Laval Oil Purifiers

Types for Lubricating Oil and Fuel Oil

FAIRFAX—Passenger—Ocean—Single Screw Steam

DESCRIPTION

The FAIRFAX was the last of three combination cargo and passenger vessels completed during 1926 for the Merchants & Miners Transportation Co. These vessels with improvements are similar to the BERKSHIRE and ALLEGHENY completed in 1923. They are very comfortable and attractive ships and were especially designed for the coastwise service.

Name—FAIRFAX, DORCHESTER, CHATHAM
Owner—Merchants & Miners Transp. Co.
Builder—Newport News S. B. & D. D. Co.
Naval Architect—Merchants & Miners Transp.
Launched—FAIRFAX, June 12, 1926; DORCHESTER, March 20, 1926; CHATHAM, Feb. 3, 1926
Completed—Sailed on maiden voyage, FAIRFAX, Sept. 17, 1926; DORCHESTER, July 20, 1926; CHATHAM, May 8, 1926.
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 368 feet; length between perpendiculars, 350 feet; breadth molded, 52 feet; depth molded to hurricane deck, 36 feet; draft loaded, 19 feet; displacement loaded, 6950 tons; gross register tonnage, 5649; net register tonnage, 3456; passenger capacity, 302 first class, 12 second class; cargo capacity cubic feet, 269,000; bunker fuel oil capacity in tons, 384 plus 210 in reserve; speed, 13½ knots.

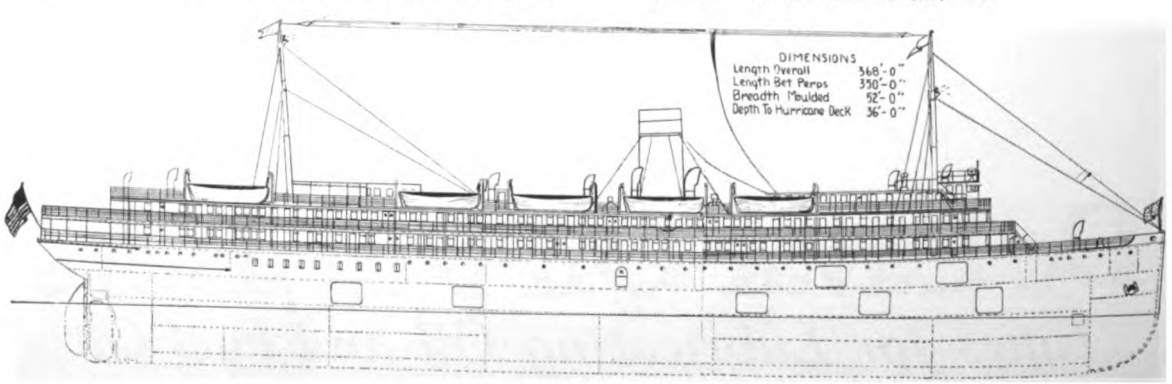
MACHINERY PARTICULARS

Main Engine—One reciprocating steam engine built by Newport News Shipbuilding & Drydock Co.; type, triple expansion 4 cylinders 25 x 42½ x 54 x 54 inches and 48-inch stroke; indicated horsepower, 2700 at 81 revolutions per minute.

Boilers—Number 4; name of maker, Newport News Shipbuilding & Drydock Co.; type, Scotch single ended; size, 14 feet 3 inches in diameter, 11 feet 2¼ inches long; 9470 square feet heating surface; fuel, oil; 200 pounds per square inch working pressure. The boilers are so designed that they can be converted to burn coal.

AUXILIARY EQUIPMENT

Manufacturers of:
Pumps—Worthington Pump & Mach. Corp.
Windlass—Hyde Windlass Co.
Winches—10, Lidgerwood Mfg. Co.
Gyro Compass & Gyro Pilot—Sperry
Boat Hoists—American Engineering Co.
Steering Engine—Hyde Windlass Co.
Radio Equipment—Radio Corp.
Fire Extinguishing—Lux, Walter Kidde.
Refrigeration—Brunswick-Kroeschell Co.
Oil Burning Equipment—Todd Oil Burner
Electric Generators—Terry Steam Turbine
Feed Water Heaters—Griscom-Russell Co.
Fuel Oil Heaters—Griscom-Russell Co.
Soot Blowers—Diamond Power
Telegraphs-Fire Alarm—Chas. Cory
Framing—Isherwood System
Electric Motors—Diehl Manufacturing Co.
Lighting Sets—Kearfott Eng. Co.
Cabin Windows—Kearfott Eng. Co.
Blower—B. F. Sturtevant Co.

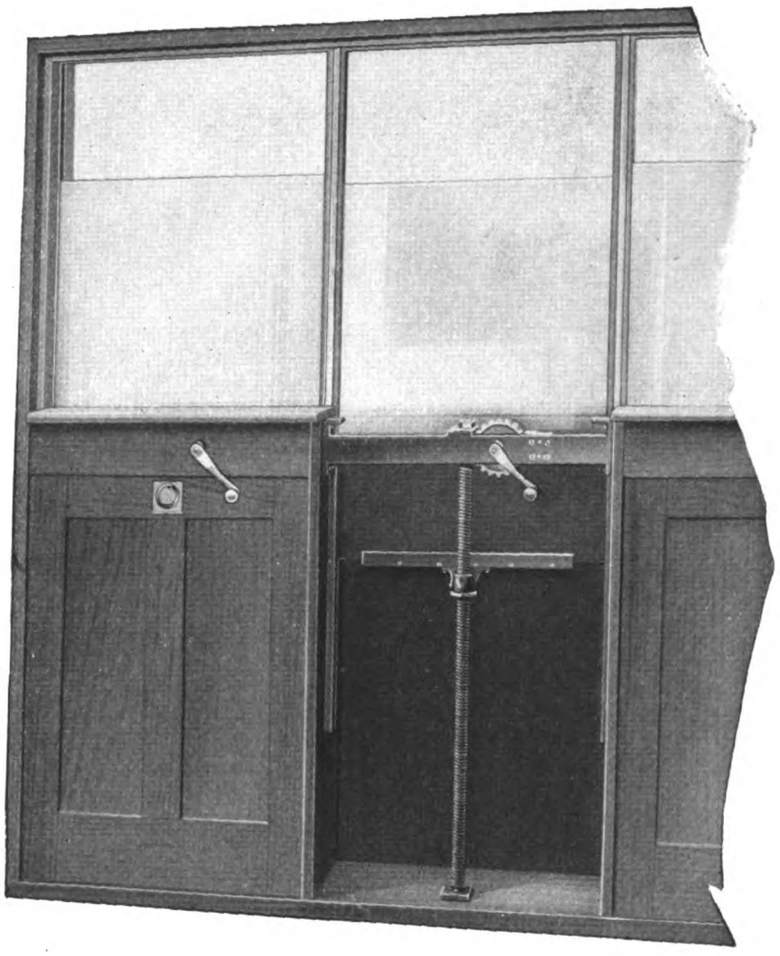


FRAMELESS WINDOWS OF MAXIMUM VISION

SIMPLE

DURABLE

DEPENDABLE



WINDOWS FOR

Promenade Decks

Pilot Houses

Deckhouses

Staterooms

Windows that are raised and lowered noiselessly and easily, of brass construction throughout, which is unaffected by dampness and salt water corrosion. Operating gear and screw constituting lifting and lowering mechanism which is unsurpassed for simplicity and lasting qualities.

All Windows have Positive Mechanical Lifts—
No Springs Used
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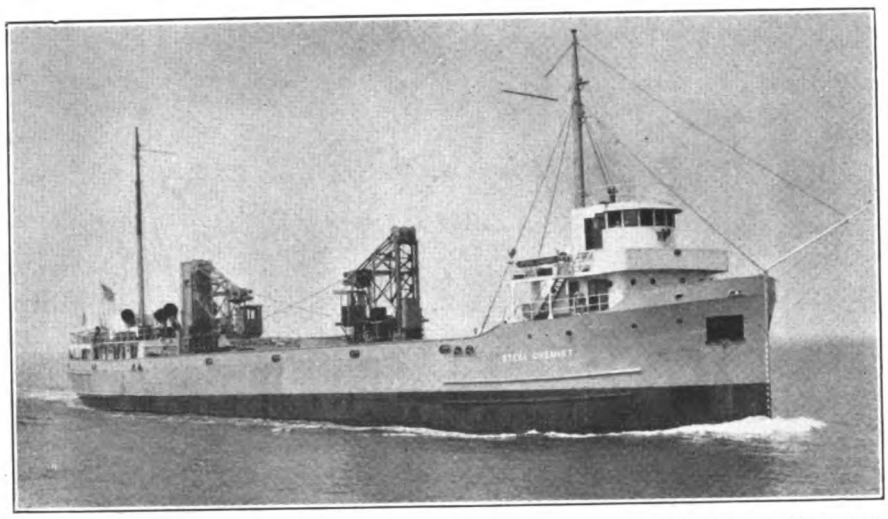
95 Liberty Street New York

STEEL CHEMIST—Freighter— Single Screw Diesel



DESCRIPTION

The STEEL CHEMIST and her sister vessel the STEEL ELECTRICIAN in hull and cargo handling arrangements are duplicates of the STEEL MOTOR and STEEL VENDOR. A change has been made in the propulsive machinery, a double acting diesel engine being fitted in the STEEL CHEMIST and diesel electric drive in the sister boat.

Name—STEEL CHEMIST
Owner—U. S. Steel Products Co.
Builder—Federal Shipbuilding & D. D. Co.
Naval Architect—John C. Craven
Launched—May 6, 1926
Completed—Aug. 28, 1926
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 257 feet 7¾ inches; length between perpendiculars, 250 feet; breadth molded, 42 feet 9 inches; depth molded, 20 feet; draft, 14 feet; displacement loaded, 3440 tons in fresh water; gross tonnage, 1694; net tonnage, 974; cargo capacity, 2000 tons, or 113,000 cubic feet; bunker fuel capacity, 75 tons; speed, 9¼ knots.

MACHINERY PARTICULARS

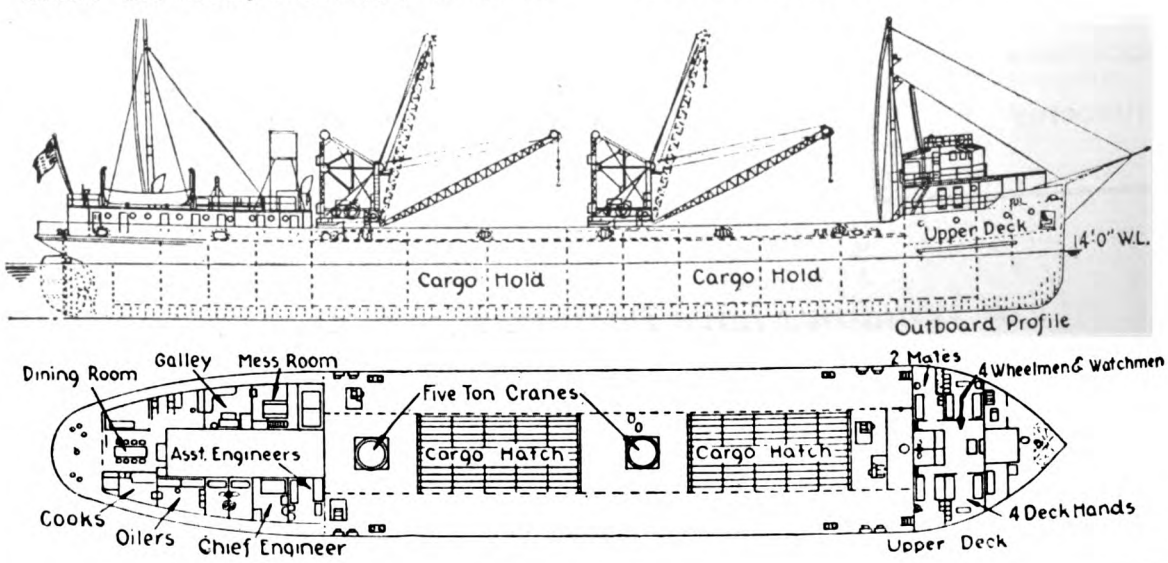
Main Engine—One, 2-cycle, 4-cylinder, double acting diesel engine; size, 16 inches diameter cylinders, 24-inch stroke; builder, Worthington Pump & Machinery Corp.

Boilers—One Donkey boiler; type, vertical fire tube; size, 5 feet 3 inches by 9 feet; fuel, oil; builder, Federal Shipbuilding & Dry Dock Co.

Auxiliary Engines—Two, Worthington diesel, each connected to a 60-k.w. Diehl generator.

AUXILIARY EQUIPMENT

Manufacturers of:
Pumps—Worthington; Westinghouse motors
Winches (warping)—Hyde Windlass Co.
Winch Motors—General Electric
Cargo Cranes—Brown Hoist Co.
Steering Engine—Hyde Windlass Co.
Refrigeration—Brunswick-Kroeschell Co.
Oil Burning Equip.—Todd Oil Burner
Telegraphs & Lighting—Chas. Cory
Gyro Compass Equip.—Sperry
Silencers—Maxim Silencer Co.
Electrical Controls—Cutler-Hammer
Oil Purifier—DeLaval Separator Co.
Radio Equipment—Radio corporation
Anchor Chain—National Malleable
Fire Extinguisher—Lux CO_2 System, Kidde
Aux. Gen.—Hill Diesel; G. E. 4 k.w.



"This Annual Distinctive Ships Issue has become a part of our Biography of Installations"

WHEN a Distinctive Ship's Roster is called—every ship with propulsion, whether Merchant or Naval, shows evidence of the influence of Cory Engineering Achievement fitingly represented in one or more of the following:

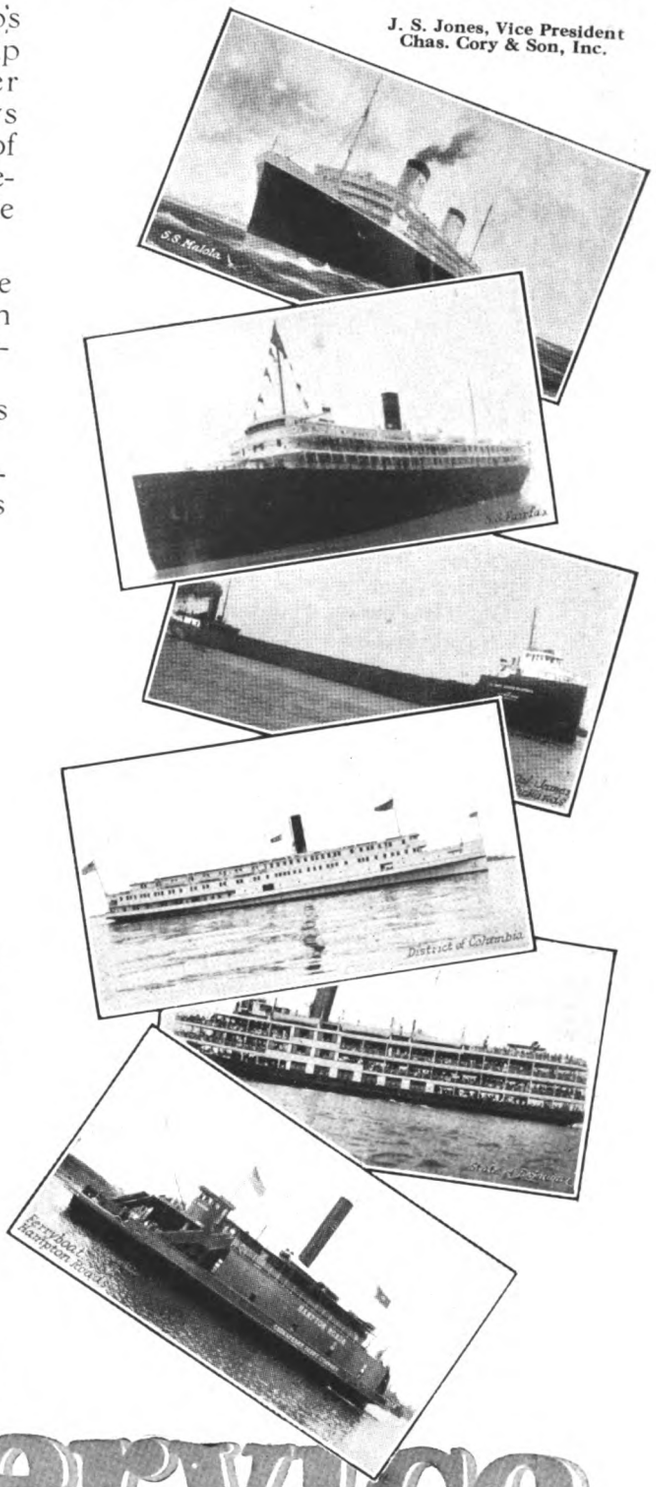
Anti-noise and Standard Telephone Systems for Ships Service, Navigation Control, General Announcing, and Interior Communication
Aero Fire Detecting and Alarm Systems
Clear View Screens
Engine Direction and Revolution Indicating Systems
Rudder Angle Indicator Systems
Switchboards
Lighting Fixturers
Wiring Appliances
Telegraphs-Electrical and Mechanical
Engineers Wrong Direction Alarms
Voice Tube Systems
Running Light Control Panel
Running and Signal Lights
Whistle Control Systems
Call Bell and Annunciating Systems
General Alarm Gong Systems
Automatic and Manual Signal Systems

Trans-oceanic, Coastwise, Yachts, Harbor, Sound, and River Vessels, all contribute in the demand for Cory Signaling, Communicating, and Lighting Equipment.

The distribution of Cory appliances is serviced through conveniently situated branches and representatives at all important American Ports.

Literature describing any of the above equipment sent on request.

J. S. Jones, Vice President
Chas. Cory & Son, Inc.



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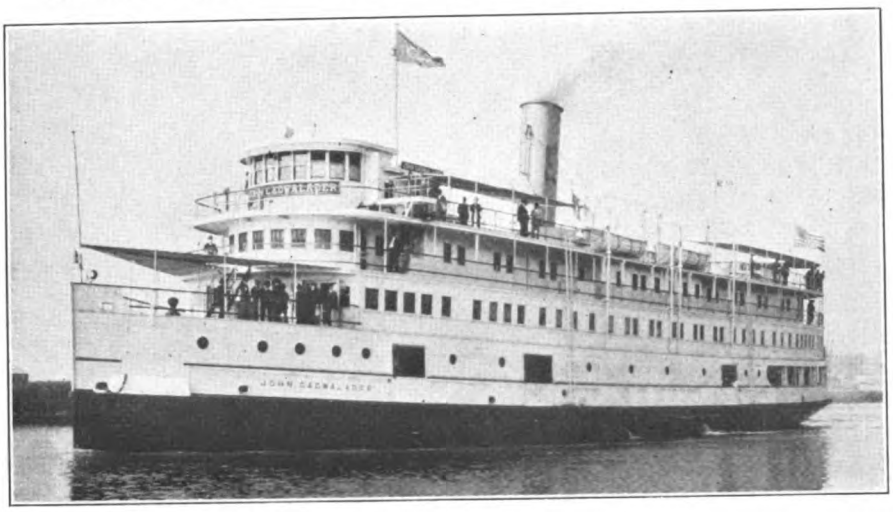
The World's Largest Manufacturer of Signaling, Communicating and Lighting Equipment

JOHN CADWALADER—Passenger—Bays—Single Screw Steamer



DESCRIPTION

This steamer was especially designed and built by Pusey and Jones Corp. to meet the conditions of service, carrying passengers and cargo between Philadelphia and Baltimore via the Chesapeake and Delaware canal. The passenger accommodations are comfortable and attractive. Cargo arrangements have been worked out for quick handling.

Name—JOHN CADWALADER
Owner—Baltimore & Philadelphia S. S. Co.
Builder—Pusey & Jones Corp.
Naval Architect—A. M. Main, Pusey & Jones Corp.
Launched—March 27, 1926
Completed—October, 1926

HULL PARTICULARS

Length overall, 230 feet; length between perpendiculars, 219 feet; breadth extreme, 45 feet; depth molded, 15 feet 10 inches; displacement loaded, 1580 tons; corresponding draft, 11 feet; gross tonnage, 1478; net tonnage, 805; passenger capacity, 167 first class, 32 third class; cargo capacity, 440 tons; bunker fuel capacity in gallons, 13,500; speed, 14¾ statute miles.

MACHINERY PARTICULARS

Main Engine—One reciprocating steam engine built by Harlan & Hollingsworth in 1903; type, triple expansion four cylinder 21 x 32 x 35 x 35 inches and 24-inch stroke; indicated horsepower, 1700.

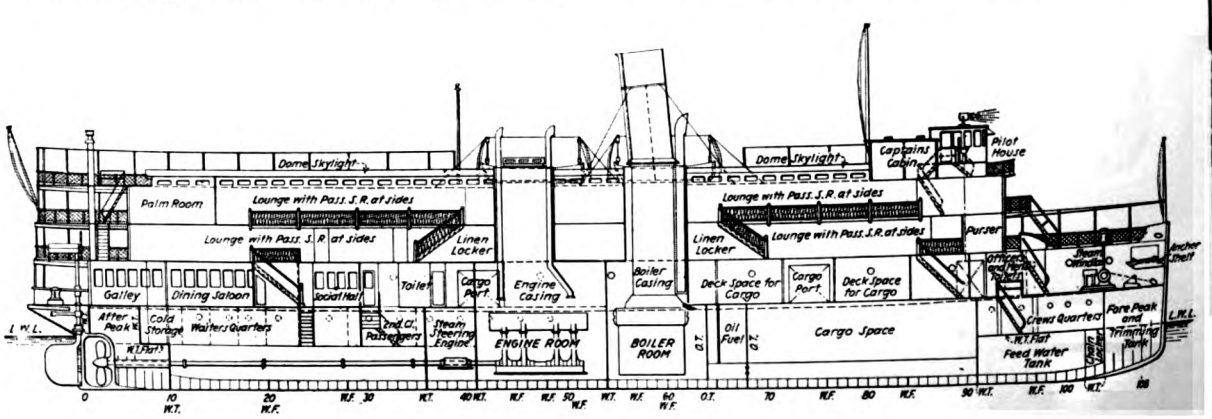
Boilers—Number 2; name of maker, Babcock & Wilcox; type, watertube; size, each of 3046 heating surface and 80.7 square feet grate surface; fuel, oil; working pressure pounds per square inch, 210.

AUXILIARY EQUIPMENT

Manufacturers of:

Generators—Two, 25 k.w. General Electric driven by Terry turbines.
Pumps—Warren Steam Pump Co.
Windlass—Hyde Windlass Co.
Steering Engine—Hyde Windlass Co.
Propeller—Federal Steel Casting Co.
Oil Burning Equip.—B. & W. with Bethlehem
Int. Communications—Charles Cory & Son

Five watertight bulk heads and two oil bulk heads subdivide the hull transversally. The lower and main decks are of steel. The superstructure decks are supported by steel girders and pillars with steel beams. Outside of all wood houses is paneled in white pine. Internal walls and bulkheads are of Haskelite. The same material is used for the inside of houses. Partitions in the way of toilets and state rooms are of plymetl. Vehisote is used in the ceiling in the dining saloon and other public spaces.



Distinctive Ships Use HASKELITE and PLYMETL

YEAR after year **HASKELITE**, the structural plywood, and **PLYMETL**, its armored companion, are specified on the distinctive ships built and reconditioned.

Experience has demonstrated the space saving, time saving, and money saving which result from the adoption of **HASKELITE** bulkheads and paneling. **PLYMETL** for bulkheads, doors, galleys, etc., is fast becoming recognized as the logical means of retarding and localizing fire, a safety measure of prime importance.

The record of 1926, like that of every recent year, shows a majority of the major contracts for ship joiner work going to **HASKELITE**. Note the following partial list of 1926 boats on which **HASKELITE** or **PLYMETL** or both were installed.

Full details of the application of these materials will be gladly sent on request.

An Imposing List of 1926 Installations

Line	Boat	Builder	H. or P.
U. S. Shipping Board	*Pres. Arthur	Los Angeles Shipbuilding Co.	H.
"	*Pres. Harding	Newport News	"
"	*America	"	"
M. & M.	Chatham	"	H. & P.
"	Dorchester	"	"
"	Fairfax	"	"
Clyde	Algonquin	"	H.
"	Iroquois	"	"
"	Shawnee	"	"
U. S. Shipping Board	*Tampa	"	"
"	*Unicoi	"	"
"	*Sawokla	Bethlehem	"
"	*City of Rayville	"	"
Erickson	John Cadwalader	Pusey & Jones	H. & P.
Grand Trunk	2 car ferries	Manitowoc	"
Private	Cruiser	Defoe Boat	"
Key Systems	2 ferries	Moore Drydock	H.
Private	Yacht	Newport News	"
Fishers Island Navigation Co.	Fishers Island	Bethlehem	H. & P.
U. S. Shipping Board	West Honaker	"	H.
"	West Cusseta	"	"
"	Crown City	"	"

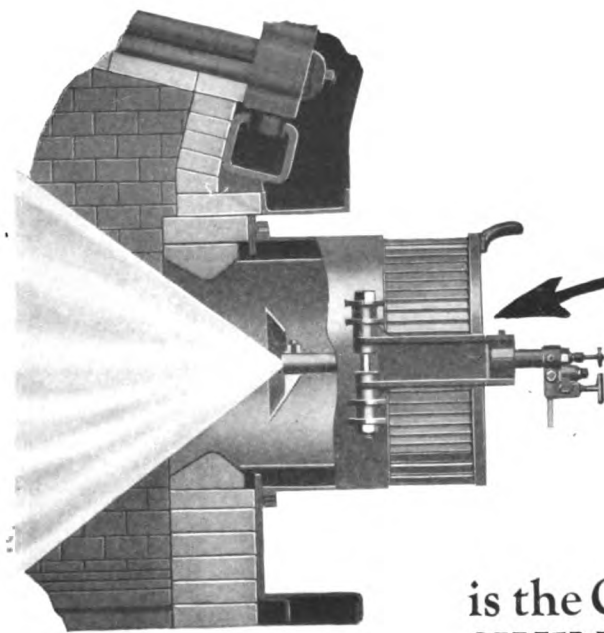
All boats listed above are new except those marked*. These are reconditioned.
"H" and "P" indicate "Haskelite" and "Plymetl".

HASKELITE MANUFACTURING CORP., 133 West Washington St., Chicago, Ill.

HASKELITE PLYMETL

MR4-Gray

COEN Oil Burning Equipment



This

is the COEN COMPANY SWING DESIGN NATURAL DRAFT FIRING FRONT for installation under Watertube (or Scotch) boilers.

This type of Oil Burning Front is giving vessel owners more than 80% BOILER EFFICIENCY over a 100% load range, without changing burner tips.

COEN COMPANY, Inc.

SAN FRANCISCO
112 Market St.

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428 Story Bldg.

NEW YORK
50 Church St.

RCA Marine Radio

on many distinctive ships of the year

Many progressive steamship companies operating large fleets have installed RCA Marine Radio on their vessels.

Complete RCA radio service includes:-

1. *Equipment.* Modern continuous wave transmitting and receiving equipment of the *vacuum tube* type.
2. *Maintenance.* Inspections, adjustments, repairs, spare parts, renewals, at ports all over the world.
3. *Operator Service.* Competent, experienced personnel selected by RCA detailed to your ship.
4. *Accounting.* Prompt and accurate settling of accounts in all parts of the world.
5. *Licenses.* All government licenses secured by RCA.

RCA coastal stations handle maritime radio traffic promptly and accurately.

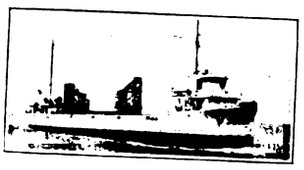
The RCA Radio Direction Finder is the greatest aid to navigation developed in modern times. Built on the super-heterodyne principle, enclosed loop. All units enclosed in one cabinet. Durable and compact—simple and reliable in operation.

S.S. Malolo, Matson Navigation Co.

2 RCA radio telegraph transmitters and receivers. Telephone attachment. RCA Radio Direction Finder.

S.S. Fairfax, Merchants and Miners Steamship Co.

RCA radio telegraph transmitting and receiving equipment.



S.S. Steel Chemist, U. S. Steel Products Co.

RCA radio telegraph transmitting and receiving equipment.

S.S. Col. James Pickands, Interlake Steamship Co.

RCA radio telegraph transmitting and receiving equipment. RCA Radio Direction Finder.

RADIO CORPORATION OF AMERICA

Marine Department

66 Broad Street, New York City

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BOSTON
NEW ORLEANS
NORFOLK, VA.

PHILADELPHIA
SAN FRANCISCO
LOS ANGELES
CLEVELAND
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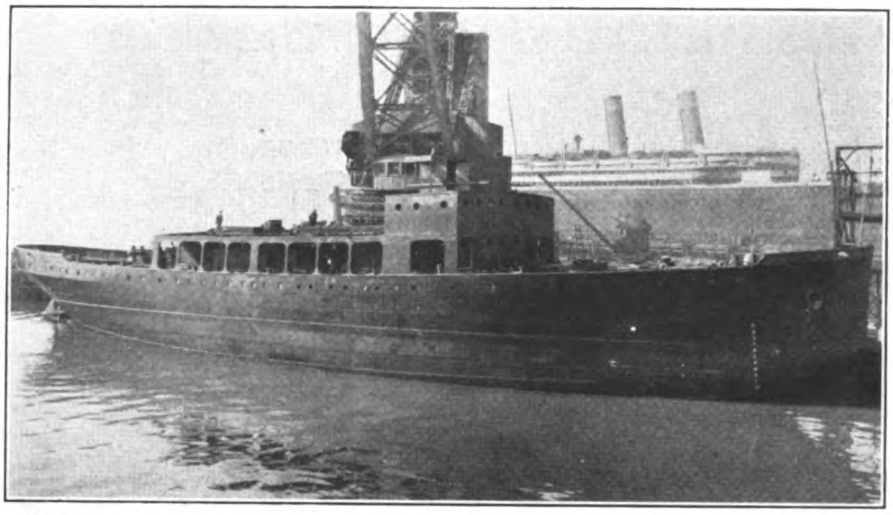
GALVESTON
HONOLULU, T. H.

RCA MARINE RADIO

NORTHLAND—Coast Guard Cutter—Diesel-Electric



Name—NORTHLAND
Owner—United States Coast Guard
Builder—Newport News S. B. & D. D. Co.
Naval Architect—F. A. Hunnewell.
Launched—Feb. 5, 1927

HULL PARTICULARS

Length overall, 216 feet 7 inches; length between perpendiculars, 200 feet; breadth molded, 39 feet; depth molded, 24 feet 9 inches; draft, 15 feet; displacement loaded, 2023 tons; bunker fuel oil capacity in tons, 207; speed, 11 knots.

MACHINERY PARTICULARS

Main Engines—Two, 6-cylinder 4-cycle, single acting McIntosh & Seymour diesel engines, each developing 600 break horsepower at 200 revolutions per minute, connected to generators.

Main Generators—Two, direct current, each of 410 kilowatts at 250 volts with a 75-kilowatt at 120 volts, direct current exciter attached to the extension of the generator shaft; builder, General Electric Co.

DESCRIPTION

A substantial steel vessel with single screw diesel electric propulsion, the coast-guard cutter, NORTHLAND under construction at Newport News is to replace the famous old cutter BEAR. Though of single screw there are two electric generating sets driven by diesel engines. The hull has been specially designed with projecting bow for ice breaking in the North.

Propulsion Motor—One, 500-volt, double armature electric motor of 1000 shaft horsepower direct connected to the single propeller shaft by a magnetic clutch.

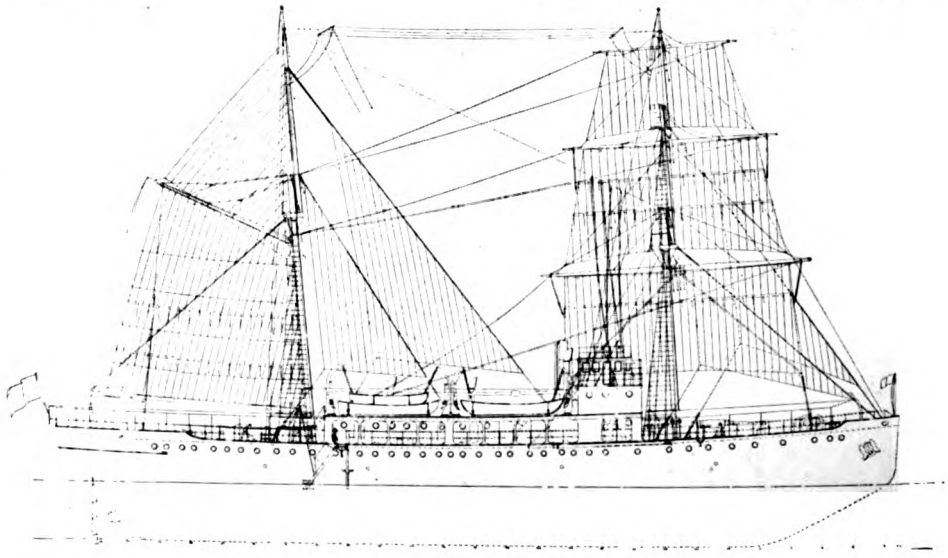
Auxiliary Engines—Two, 6-cylinder 4-cycle, Winton diesel engines of 90 brake horsepower each, direct connected to a 60-kilowatt 120 volt 500 revolutions per minute General Electric generator. One 25 brake horsepower Hill diesel engine driving an 18-kilowatt 120-volt General Electric generator.

AUXILIARY EQUIPMENT

Manufacturers of:

Pumps—Warren Steam Pump Co.; Goulds Pump Co.; William E. Quimby Inc.; and Trimount Rotary Power

Windlass—American Engineering Co.
Steering Engine—American Engineering Co.
Refrigeration—York Mfg. Co.
Oil Purifiers—DeLaval Separator Co.
Ventilating Fans—B. F. Sturtevant Co.



How to make your DECKS last longer

25 Miles of Deck Seam !

That's the total length of the deck seams on the *S.S. Malolo*, built by Cramp's Shipyard, Philadelphia, for Matson S.S. Line. It required five tons of Marine Glue to make these decks leak-proof. Think of the cost of labor and material needed for every recaulking on such a vessel.

That is why Jeffery's Marine Glue was specified by Gibbs Bros., the designers. It *saves* several recaulkings. It does not crack, pulverize or chip out as do pitch or inferior Marine Glues. Being elastic and resilient it expands and contracts with the deck.

The illustrations on the right show the successive stages of preparing and applying Jeffery's Marine Glue on the *S. S. Malolo*.

1. Preparing deck seams

Clean out seams and caulk well leaving space above caulking for Marine Glue. Keep dry and do not use oil on caulking irons.

2. Melting the Glue

Melt Jeffery's Marine Glue until it becomes fluid to a consistency like oil that does not "string out". Do not overheat or the Marine Glue will become brittle. The electric heater illustrated herewith as used on the S.S. Malolo is the most efficient. (Full description of the heater and where you can secure it given on request). Use the Marine Glue as promptly after melting as possible.

3. Paying Seams

Run the melted Marine Glue into seams with a paying shell or ladle. Hold the nose of the shell one inch above seam to avoid air bubbles. Allow the Marine Glue to overflow and let excess remain for several days to settle.

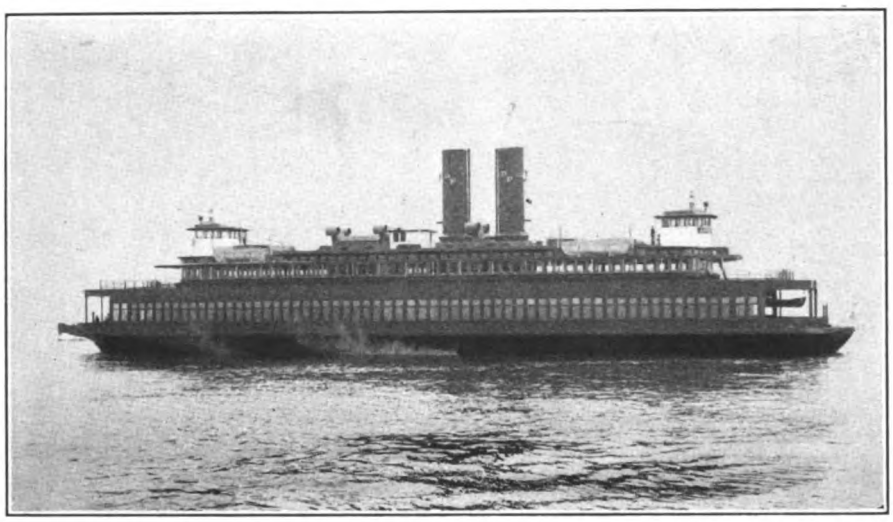
4. Scraping the deck

Remove excess Marine Glue from deck with scraper. Scrape off diagonally to seam. In hot weather, applying water to deck before scraping often aids to smooth out the surface.

Our booklet, "Marine Glues—What to Use and How to Use it" will be sent on request

L.W. Ferdinand & Co.
152 Kneeland Street, Boston, Mass.

AMERICAN LEGION—Ferry—Double Ended—Screw Steamer



DESCRIPTION

A double decked double ended ferry boat with two team gangways and two passenger cabins, one on each side of the main deck. Recently completed, this vessel is the latest ferryboat for the city of New York. This boat is designed to maintain the regular schedule between Manhattan and Staten Island, but will have more power than the others.

Name—AMERICAN LEGION
Owner—City of New York
Builder—Staten Island Shipbuilding Co.
Naval Architect—R. W. Morrell
Launched—Sept. 29, 1926
Completed—Feb. 11, 1927
Classification—American Bureau of Shipping, A-1 (E) ferry service

HULL PARTICULARS

Length overall, 264 feet; length between perpendiculars, 251 feet; breadth molded, 66 feet; depth molded, 17 feet 9 inches; draft, 12 feet 6 inches; displacement loaded, 1728 tons; gross tonnage, 2089; net tonnage, 1421; passenger capacity is 2500; automobile capacity is 32; bunker fuel oil capacity in gallons, 18,000; speed, 15 knots.

MACHINERY PARTICULARS

Main Engines—Two double compound condensing 22½ x 50 inches diameter of cylinders and 30-inch stroke; about 4000 indicated horsepower; built by Staten Island Shipbuilding Co.

Boilers—Four, built by Babcock & Wilcox Co.; marine water tube type of 14,308 square feet of total heating surface; working pressure, 225 pounds per square inch; fuel, oil; forced draft by means of two turbine-driven blowers; oil burners are fitted with a variable control system to regulate the steaming while in the slip.

AUXILIARY EQUIPMENT

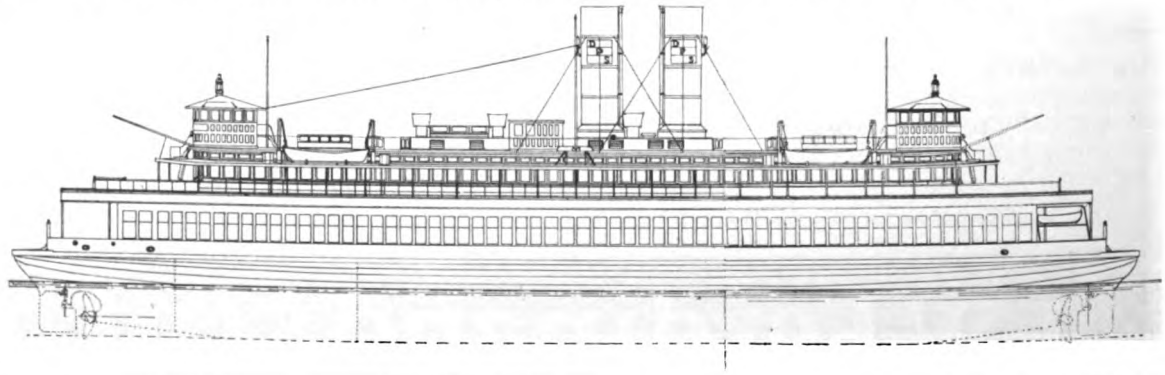
Manufacturers of:

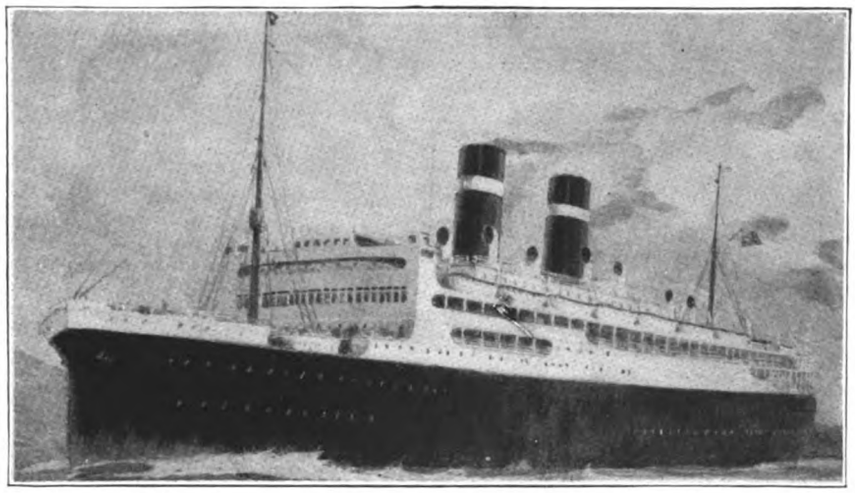
Pumps—Worthington; Davidson; Staten I. S. B. Co.
Heaters, Feed Water—Davis Eng. Corp.
Fire Extinguishers—Bethlehem S. B. Corp.
Blowers—B. F. Sturtevant Co.
Steering Engine—Hyde Windlass Co.
Propellers—American Steel Foundries
Oil Burning—Todd O. B. & Eng. Corp.
Generators—General Electric
Valves—Lunkenheimer-Leslie
Soot Blowers—Diamond Power Spec. Co.
Telegraph & Signals—Chas. Cory

The propelling machinery consists of two vertical compound steam engines coupled together and driving a cast steel propeller at each end.

The team gangways are divided by a center house enclosing the machinery. There is an upper saloon deck with accommodations for passengers only.

The hull and the superstructure up to the saloon deck are built of steel. The hull is divided into six watertight compartments, comprising an engine room, boiler room, two peak compartments and two hold compartments.





S. S. California—now under construction at Newport News S. B. & D. D. Co., for the Panama Pacific Line (I. M. M. Co.) for service between New York and California—is equipped with twelve Sturtevant Fans. Four will supply forced draft to the boilers, four will be used for refrigeration and four for main motor cooling.

Sturtevant Multivane Fan

Sturtevant

Marine Products

Heating & Ventilating Equipment

Mechanical Draft Equipment

Turbine—Motors Blowers

Ventilating Sets Heaters

Generating Sets

Exhausters

Gasoline and Steam Engines

Equipment that gives the utmost in service!

BEHIND all Sturtevant Marine Equipment is a reputation for quality that must be maintained—a reputation that has been earned by over sixty years in manufacturing products of sound design and unvarying dependability.

High efficiency, economical operation, long service and extraordinary freedom from trouble are features that have made Sturtevant Equipment the choice of leading Marine architects and engineers.

We will gladly recommend equipment that will meet your particular requirements.

Sturtevant
PUTS AIR TO WORK

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

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Detroit, Mich.
Hartford, Conn.
Indianapolis, Ind.
Kansas City, Mo.
Los Angeles, Calif.
Minneapolis, Minn.
Montreal, P. Q.
New York City
Pittsburgh, Pa.
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St. Louis, Mo.
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Toronto, Ont.
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Plants Located at

Berkeley, Calif.
Camden, N. J.
Farmington, Mass.
Galt, Ontario
Hyde Park, Mass.
Sturtevant, Wis.

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American Trading Co. ..... Tokyo
American Trading Co. ..... Shanghai
Ernshaws Docks & Honolulu Iron Works ..... Manila
H. P. Gregory & Co., Ltd. ..... Sydney
Blair Reed & Co., Ltd. ..... Wellington
Wesselhoeft & Poor ..... Caracas
Wesselhoeft & Poor ..... Bogota
General Machinery Co. ..... Tampico
Pedro Martinto, Inc. ..... Lima
A. E Baker ..... Johannesburg

1684

GRAND RAPIDS—Carferry—Great Lakes—Twin Screw Steam

DESCRIPTION

This carferry built for the Grand Trunk Railway is a sister boat to the MADISON, recently completed for the same company. These ferries are quite similar to those constructed for the Ann Arbor & Pere Marquette railroads. They are large, powerful and fast and are good ice breakers. The Manitowoc Shipbuilding Corp. has built a numberr of these modern carferries.

Name—GRAND RAPIDS
Owner—Grand Trunk Railway System
Builder—Manitowoc Ship Building Corp.
Naval Architect—Manitowoc S. B. Corp.
Launched—GRAND RAPIDS, Oct. 23, '26; MADISON, Jan. 19, '27
Completed—GRAND RAPIDS, Dec. 3, '26; MADISON, March 3, '27
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 360 feet; length between perpendiculars, 348 feet; breadth molded, 56 feet; depth molded, 21 feet 6 inches; draft, 16 feet; displacement loaded, 6380; gross tonnage, about 2900; net tonnage, about 1400; passenger capacity, 12; cargo capacity, 30 freight cars; bunker fuel capacity, in tons, 400; speed, 14 miles.

MACHINERY PARTICULARS

Main Engine—Two, triple expansion; size, 20½ x 34 x 56 inches x 36-inch stroke; built by Manitowoc Shipbuilding Corp.

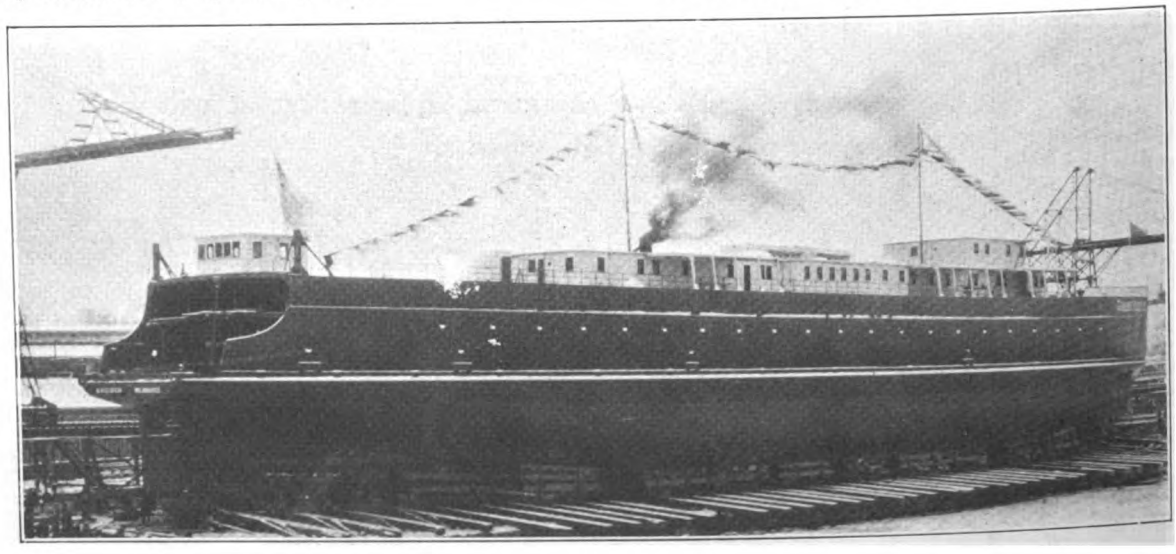
Boilers—Four scotch marine type; size 14 feet 6 inches in diameter by 12 feet long; 185 pounds working pressure; built by Manitowoc Shipbuilding Corp.; fuel, coal.

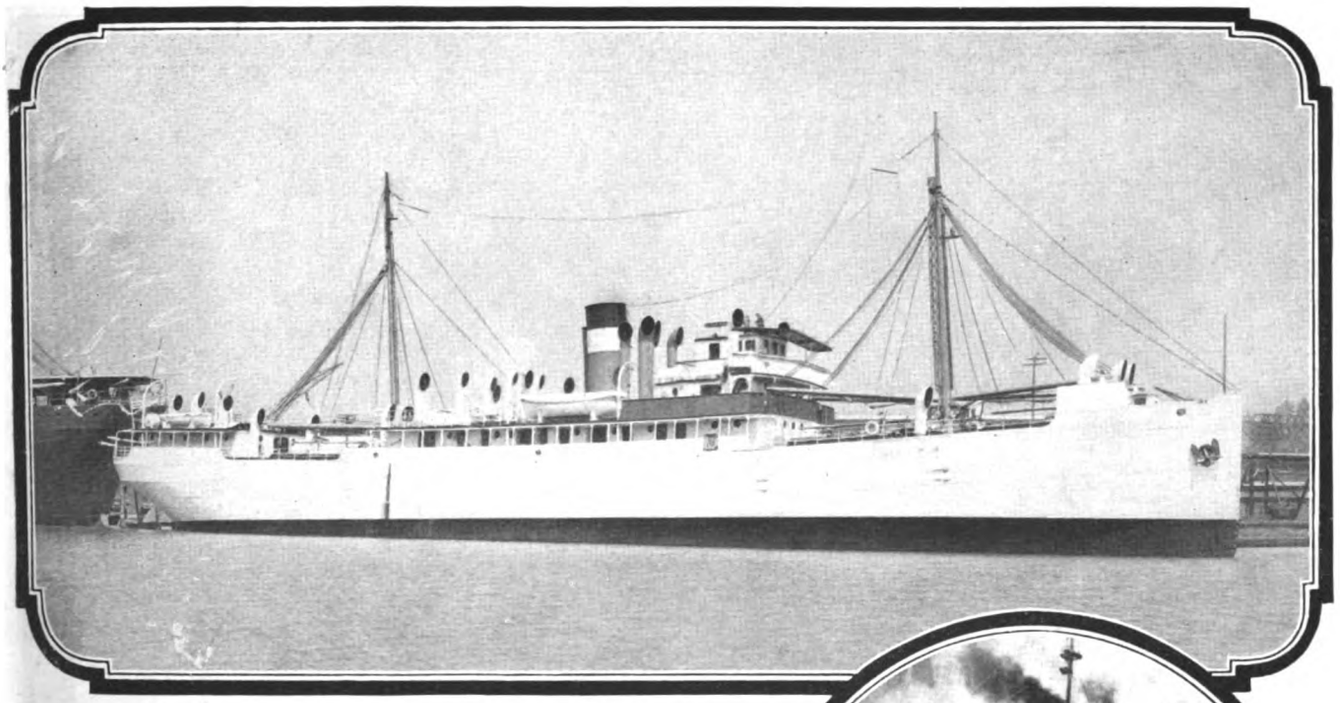
AUXILIARY EQUIPMENT

Manufacturers of:
Windlass—Manitowoc Shipbuilding Corp.
Winches—Manitowoc Shipbuilding Corp.
Steering Engine—Manitowoc S. B. Corp.
Propellers—Manitowoc Shipbuilding Corp.
Refrigeration—Brunswick-Kroeschell Co.
Generators—Engberg Elec. & Mech. Works

The carferries GRAND RAPIDS and MADISON are similar to the Ann Arbor and Pere Marquette ferries in construction being built on the transverse system of framing. Both of these ferries are classed by the American Bureau of Shipping and their scantlings are in excess of the bureau's requirements in certain instances.

The elaborateness of hull and machinery of these vessels compare with an ocean freighter.





Did You Know

—that we build boats, from tugs to big freighters?

—that we build marine engines, boilers and auxiliaries?

—that we are ideally situated on Lake Michigan?

—that we have a trained crew of skilled workmen?

—that we have splendid docking facilities?

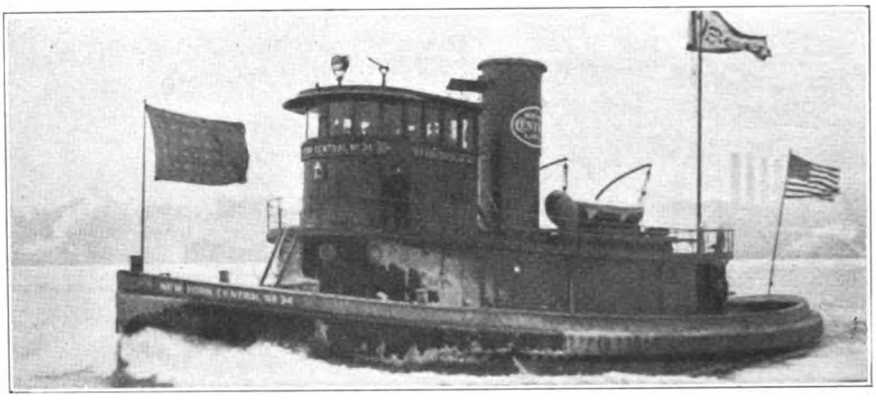
—that we are veteran successful boat-builders?

Write for details

MANITOWOC SHIPBUILDING CORP.
Manitowoc, Wis.

MANITOWOC

NEW YORK CENTRAL NO. 34—Diesel Electric Tug



DESCRIPTION

A diesel electric tug boat of substantial steel construction throughout used for towing barges and carfloats and for shifting in the New York Central service in and about New York harbor. This type of drive with pilot house control gives the captain control of operation.

Name—NEW YORK CENTRAL No. 34
Owner—New York Central railroad
Builder—Staten Island Shipbuilding Co.
Naval Architect—J. W. Millard & Bro.
Launched—Oct. 15, 1926; completed, Jan. 11, 1927; sister tug New York Central No. 33, was launched Sept. 11, 1926, and completed Jan. 8, 1927.
Classification—Harbor tug boat.

HULL PARTICULARS

Length overall, 108 feet; length between perpendiculars, 96 feet; breadth molded, 26 feet; depth molded, 13 feet 3 inches; draft, 10 feet 2 inches; gross tonnage, 242; net tonnage, 164; bunker fuel capacity, in gallons, 8000; speed, 12 knots.

MACHINERY PARTICULARS

Main Engines—Two, Ingersoll-Rand type PR 6-cylinder, 4-cycle solid injection 14-inch diameter by 19-inch stroke, oil engines.

Main Generators—Two, General Electric, 270 kilowatts, compound wound and each with a 30 kilowatt exciter attached. Each generator is direct-connected to one of the above mentioned oil engines arranged parallel to the center line in a fore and aft direction. They operate at 265 revolutions per minute. Connected in series they normally supply 480-volt direct current for the 650 shaft horsepower double armature propulsion motor.

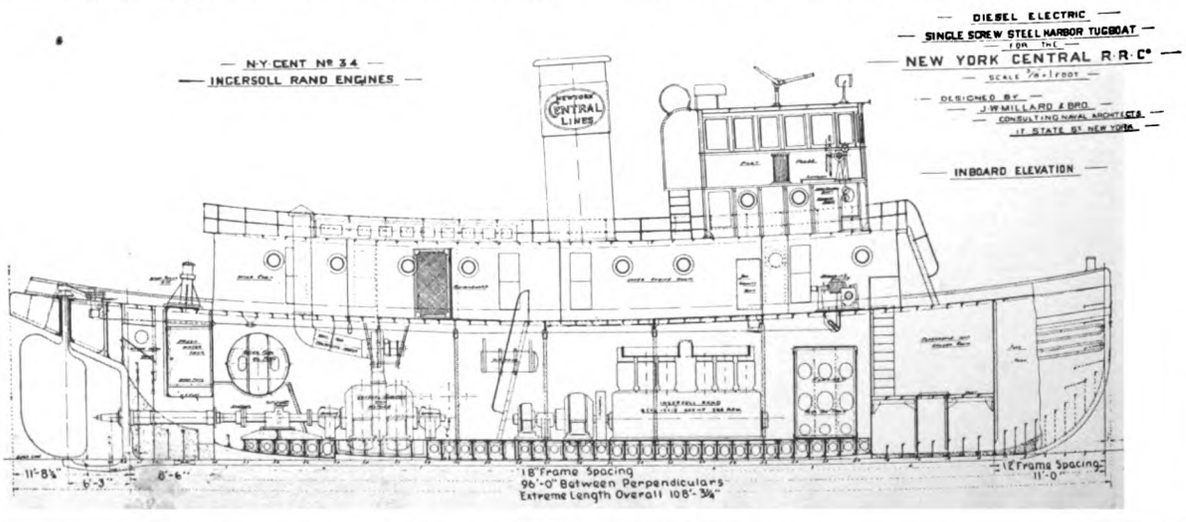
Electric Motor—One, General Electric, direct-connected to propeller shaft capable of delivering 650 shaft horsepower at from 115 to 145 revolutions per minute.

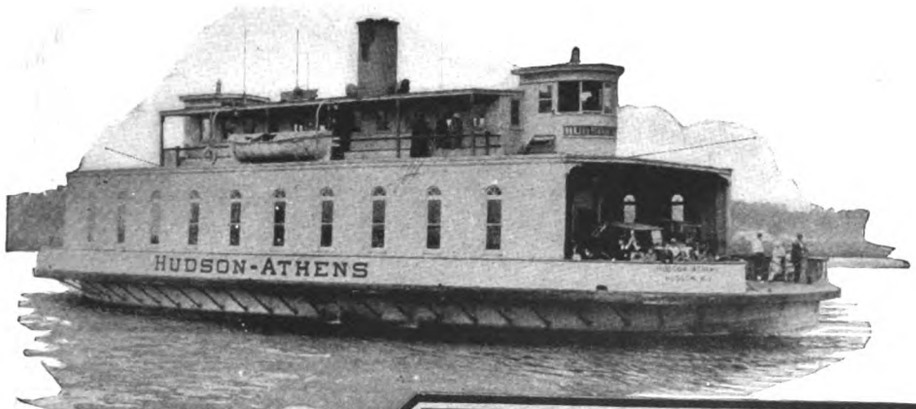
AUXILIARY EQUIPMENT

Manufacturers of:
Pumps—Northern Pump; Cameron
Steering Engine—Hyde Windlass Co.
Propeller—F. Ferguson & Son
Electric Generators—General Electric Co.
Silencers—Maxim Silencer Co.
Valves—Lunkenheimer Co.; Leslie
Diesel Aux. Gen. Set—Hill Diesel Engine Co.
Compressor—Ingersoll-Rand.
Heating—American Radiator Co.
Pilot House Control—Cory

Except for size the tug boat illustrated on this page is the same in exterior appearance as other tugs of the fleet. Though not required, the stack has been retained for housing the exhaust pipes of the engines and ventilation.

There is the outstanding feature, high economy of operation, approximately 25 gallons of fuel oil is used to drive this tug one hour.





A New Epoch in Transportation

Economical and dependable power has always been the outstanding ideal of marine engineering. As a result, every now and then, a new epoch in marine transportation is ushered in.

The application of the oil engine for ship propulsion is now rapidly gaining in favor everywhere. This is because it is proving to be the most economical prime mover ever built.

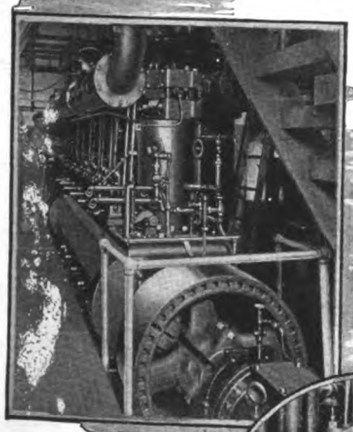
The Hudson-Athens ferry service, which has used all forms of mechanical drive during its years of operation, selected an Ingersoll-Rand Oil Engine for the ferry boat Hudson-Athens, shown above. Let us give you full details of this engine's seven years of successful service.

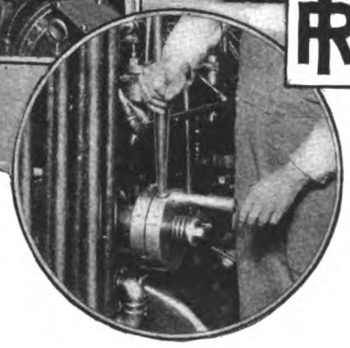
Over 50% of the world's new tonnage built in 1926 was equipped with Oil Engines.

INGERSOLL-RAND COMPANY, 11 Broadway, New York City

Offices in principal cities the world over

For Canada Refer-Canadian Ingersoll-Rand Co., Limited
260 St. James Street, Montreal, Quebec.





The many sizes of Ingersoll-Rand Marine Oil Engines are available for either direct-connected or electric drive. All are furnished with single-lever control.

R-1249

Ingersoll-Rand

48-MOE

FRESNO and Class—Double Ended Ferry—Diesel Electric

DESCRIPTION

A steel diesel electric double ended automobile-carrying ferryboat for service on San Francisco bay. No foot passengers are carried. There is both pilot house and engine room control. The main hull is built on the transverse system of framing of steel up to the main deck and with a steel-sided enclosure for carriage of automobiles.

Name—FRESNO; STOCKTON; TAHOE
Owner—Southern Pacific Co.
Builder—Bethlehem S. B. Corp., Union Plant
Launched—FRESNO. Jan. 15, 1927
Completed—Under Construction
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall 256 feet; length between perpendiculars, 234 feet; breadth molded, 46 feet 3 inches; breadth extreme, 66 feet 1 inch; depth molded, 19 feet 6 inches; draft molded, 12 feet; displacement loaded, 1495 tons; passenger capacity in automobiles, 500; automobile capacity, 100; bunker fuel capacity, 32 tons; speed, 13 knots.

MACHINERY PARTICULARS

Main Engines—Four, 6-cylinder, 4-cycle solid injection diesel engines; size, 450 brake horsepower each; built by New London Ship & Engine Co.; each engine is direct-connected to a generator.

Main Generators—Four, built by General Electric Co., size, 275 kilowatts each with a 40-kilowatt exciter attached to the generator shaft extended.

Propulsion Motors—Two, built by General Electric Co.; size, 1250 shaft horsepower each.

Auxiliary Engine—One gasoline engine of 100 brake horsepower, built by Sterling Gas Engine Co.

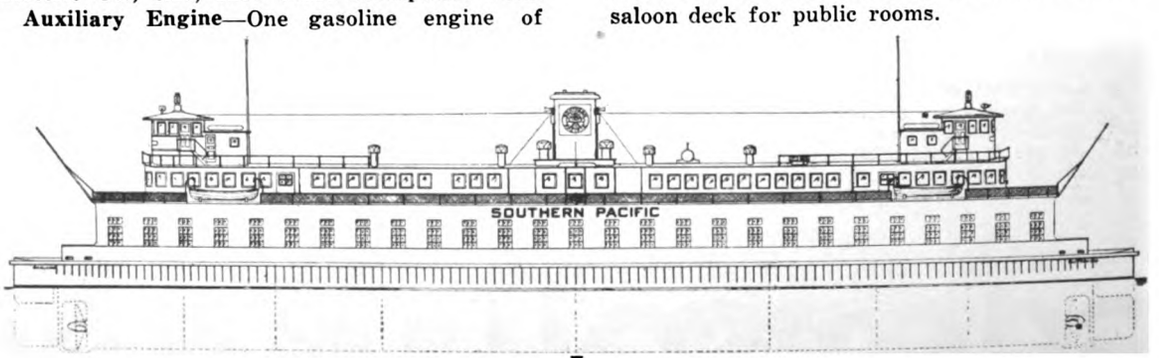
AUXILIARY EQUIPMENT

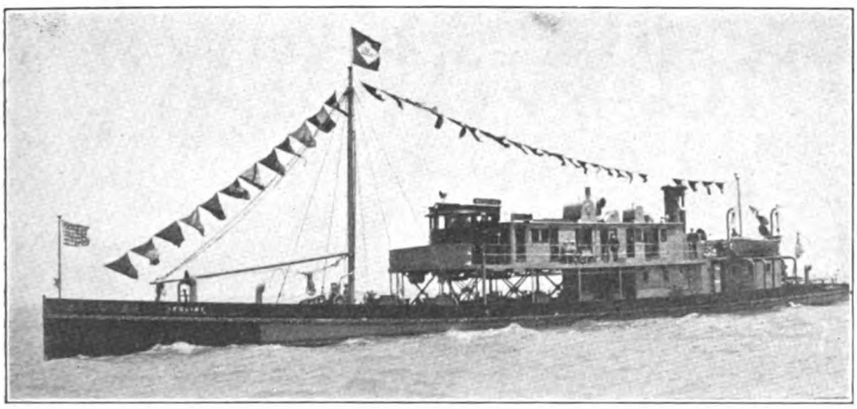
Manufacturers of:
Pumps—Northern Rotary; Byron Jackson
Steering Engine—Allan Cunningham
Propellers—Bethlehem Shipbuilding Corp.
Electric Generators—General Electric Co.
Valves—Lunkenheimer Co.

Four double ended diesel electric ferries of this type are under construction for the Southern Pacific Co. for service as automobile carriers on San Francisco bay. Three of these ferries named above are being built by the Bethlehem Shipbuilding Corp., Union Plant, San Francisco. The fourth ferry is being built by the General Engineering & Drydock Co., San Francisco.

With four diesel engine generating sets and two propulsion motors a maximum of dependability may be expected. Pilot house control will give the captain instantaneous co-ordination of effective power to carry out maneuvering as the necessity arises. There will also be economy of operation.

Automobiles are accommodated amidships in seven rows. There is a wood house on the saloon deck for public rooms.



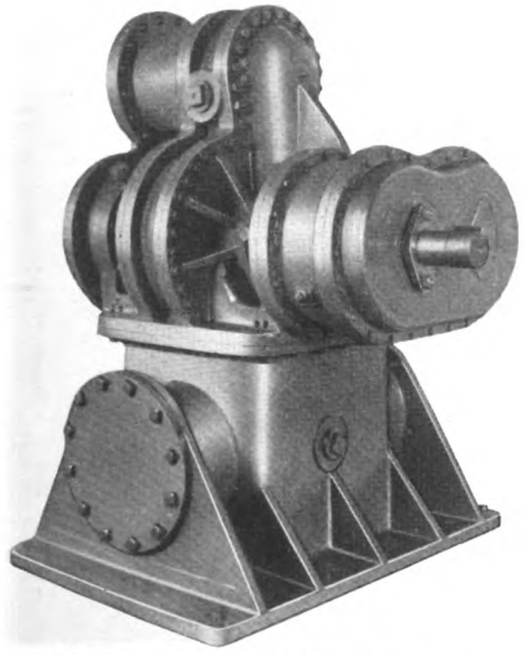


Union Oil Co.'s Tanker, M. S. Redline, equipped with Northern Rotary Pumps.

A Record!

Northern Rotary Pumps *on Diesel Driven Jobs:*

92 Northerns on 14 Tankers
47 Northerns on 18 Tugs
42 Northerns on 9 Ferries
38 Northerns on 13 Barges
:and:
145 Northerns on 9 Diesel Dredges



A Typical 1500 BPH Northern Cargo Installation.

It's a rare Diesel job, any place, that doesn't include Northern Pumps in its equipment. The reasons are: That they are compact, more efficient because of lateral ports, free from vibration, quiet, and above all DEPENDABLE. You can bet on a Northern in every emergency—that's proof of its everyday dependability. The Northern's guarantee is: That YOU must be absolutely satisfied. Ask any Northern user, or write for surprising facts in new bulletins.

NORTHERN PUMP CO.

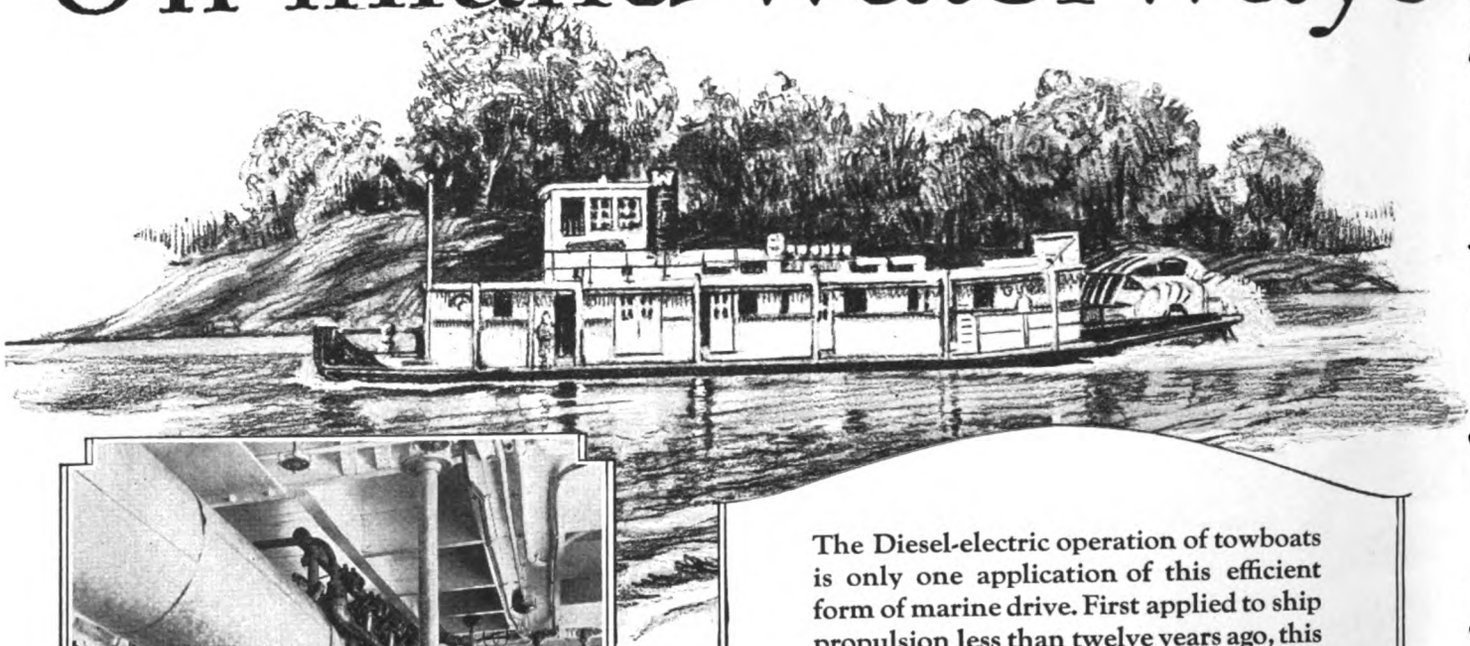
DIVISION OF
NORTHERN FIRE APPARATUS CO.
MINNEAPOLIS MINNESOTA.U.S.A.

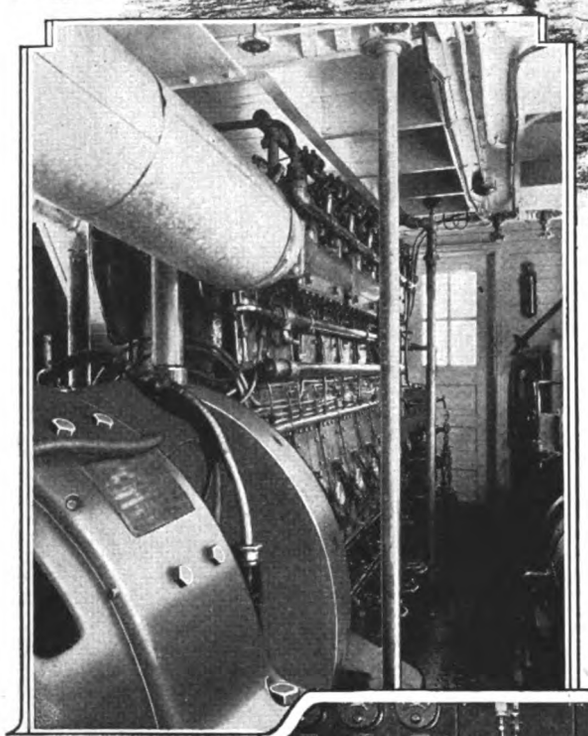
Cleveland Representative:

F. E. Robinson

6007 Euclid Ave., Cleveland

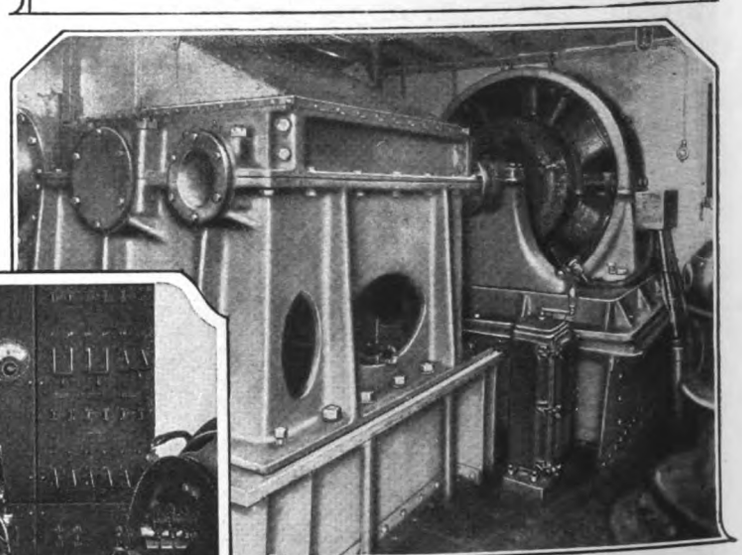
On inland waterways

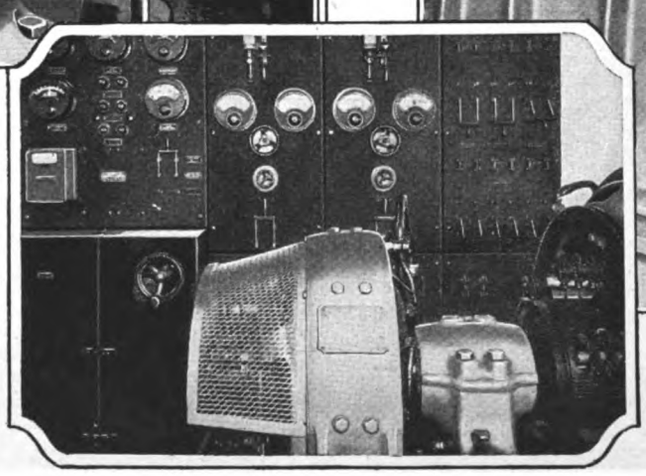




The Diesel-electric operation of towboats is only one application of this efficient form of marine drive. First applied to ship propulsion less than twelve years ago, this equipment is now employed to drive

Tugboats	Tankers
Fire Boats	Dredges
Ferryboats	Cargo Boats





GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

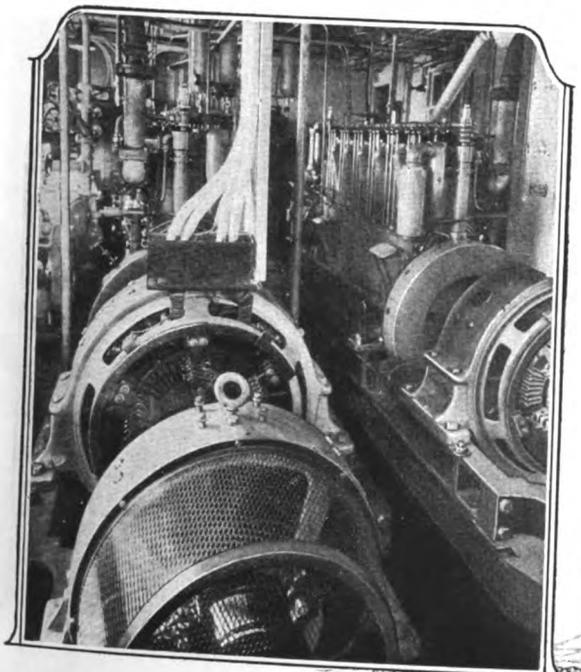
...s with *Diesel-Electric Drive*

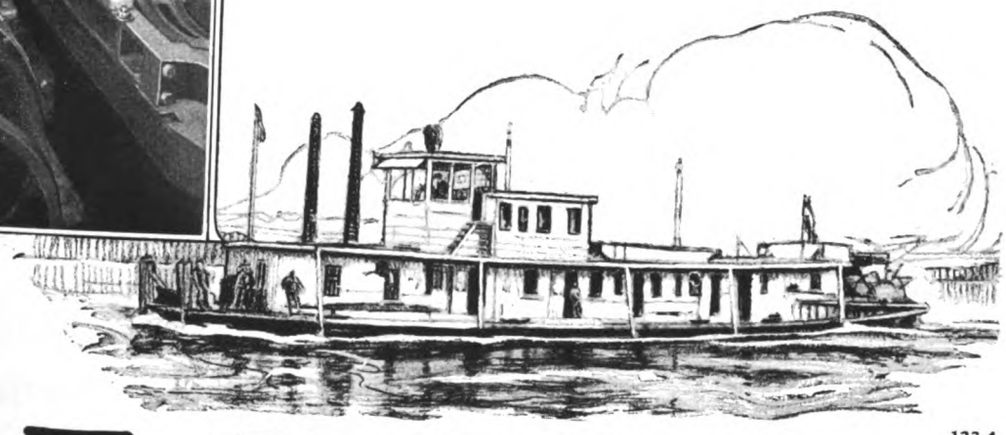
A belching cloud of smoke pervades Mark Twain's classic chronicle of the Mississippi steamboats. It was the black herald that announced the approach of these famous river craft—that symbolized an era of crude, inefficient operation that has passed forever.

No such cloud overhangs the new towboats in the service of the engineering corps of the United States Army. These three Diesel-electric, stern-wheel ships, the "Gillette", the "Burnette", and the "Gouverneur", equipped with General Electric propulsion apparatus, now ply the waters of the Ohio, Kentucky, and Mississippi rivers.

There were good reasons why "Uncle Sam", the most discriminating of buyers, abandoned tradition and purchased this new type of drive for this service. Diesel-electric operation provides greater flexibility and higher efficiency at varying speeds.

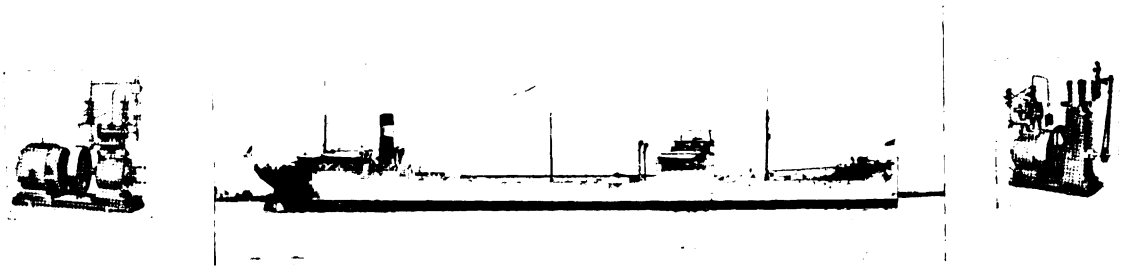
These boats are controlled from the pilot house in much the same manner as a motorman operates a trolley car. The control is such that the propelling motors operate at high efficiency over a wide range of motor speeds and a large percentage of primary power is converted into towing energy.





"The Standard for all Marine Installations"

BRUNSWICK-KROESCHELL REFRIGERATION



Refrigeration for Tankers

Brunswick-Kroeschell equipment is installed upon such a large number of tankers that their refrigeration duty can be taken as typical.

Investigation shows that the meat storage room is kept at 20-24 F. and the vegetable storage room at 40-45 F. Generally, there is also a 25 gal. or 40 gal. water butt of cooled drinking water, although, in some cases, a 40 lb. or 125 lb. ice-making set is installed; in a few cases, the equipment includes both butt and set.

Investigation also indicates that these tankers, generally, have crews of from 45 to 50 men, or half this number, that their voyages range from eighteen days to four months and that meat for the round trip is taken in at the home port, while vegetables are restocked *en route* as needed.

For crews of 45 to 50 men and for a four months voyage there are, in round numbers, 1000 cu. ft. of meat storage rooms and 500 cu. ft. of vegetable storage rooms, and, for a three months cruise, 600 cu. ft. of meat storage rooms and 400 cu. ft. of vegetable storage rooms. For crews of 20-25 men on an eighteen days voyage these storage rooms are, respectively, of 350 cu. ft. and 250 cu. ft., round numbers.

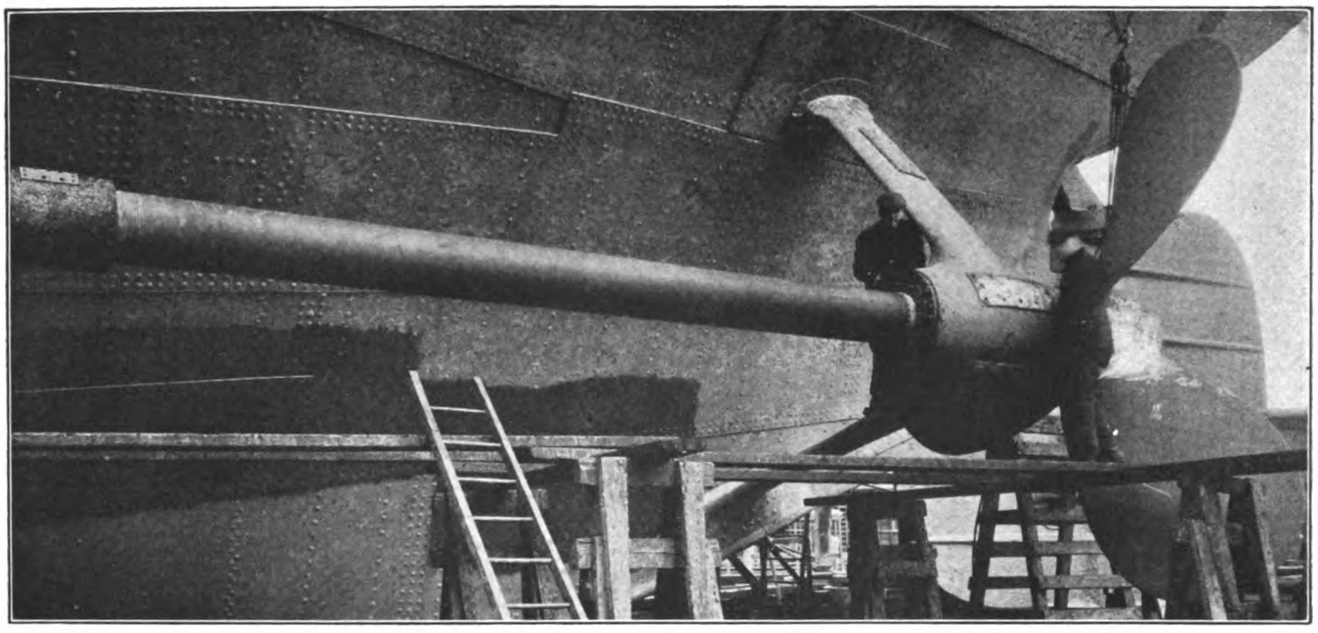
Additional interesting data relative to the refrigeration of tankers will be furnished to all interested.

BRUNSWICK-KROESCHELL COMPANY

Refrigerating & Ice Making Machinery-Power & Heating Boilers

New Brunswick, N.J. ~ ~ ~ Chicago, Ill.

DISTRICT DISTRIBUTION & SERVICE IN PRINCIPAL CITIES



Port shaft of a Luckenbach Line steamship protected with a "U.S." Rubber Sleeve.

A rubber-covered shaft will not corrode . . .

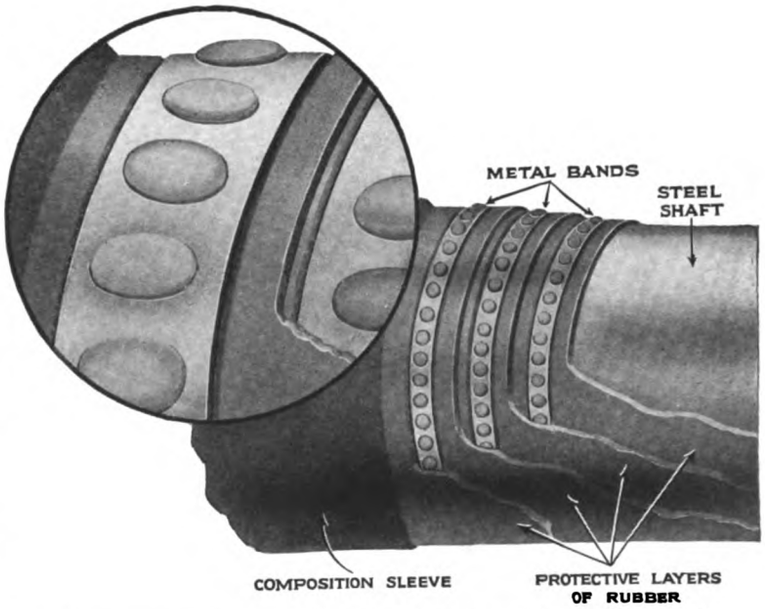
Corrosion, erosion, electrolysis, and pitting are taking years of service out of your propeller shafts.

Marine experts have realized for years the unusual possibilities of rubber, with its natural waterproofing qualities, as a shaft protection. It remained, however, for the United States Rubber Company to develop a satisfactory compound for shaft sleeves—and a satisfactory method of permanent application.

Today, "U. S." Protective Sleeves are proved insurance against shaft deterioration. They have been approved by the American Bureau of Shipping and Lloyds, and adopted as standard equipment on many large steamship lines and U. S. Navy vessels.

Easily and quickly applied—at an initial and ultimate cost low in comparison to other methods of shaft protection.

Write for our descriptive booklet—"Protective Rubber Covering for Propeller Shafts."



Illustrating exclusive method of application and binding of "U.S." Rubber Sleeve protection. (PAT. APPLIED FOR) Note the protective layers of rubber and the metal bands which insure permanent bond of sleeve to the shaft.

United States Rubber Company

Marine Sales Department

1790 Broadway New York City

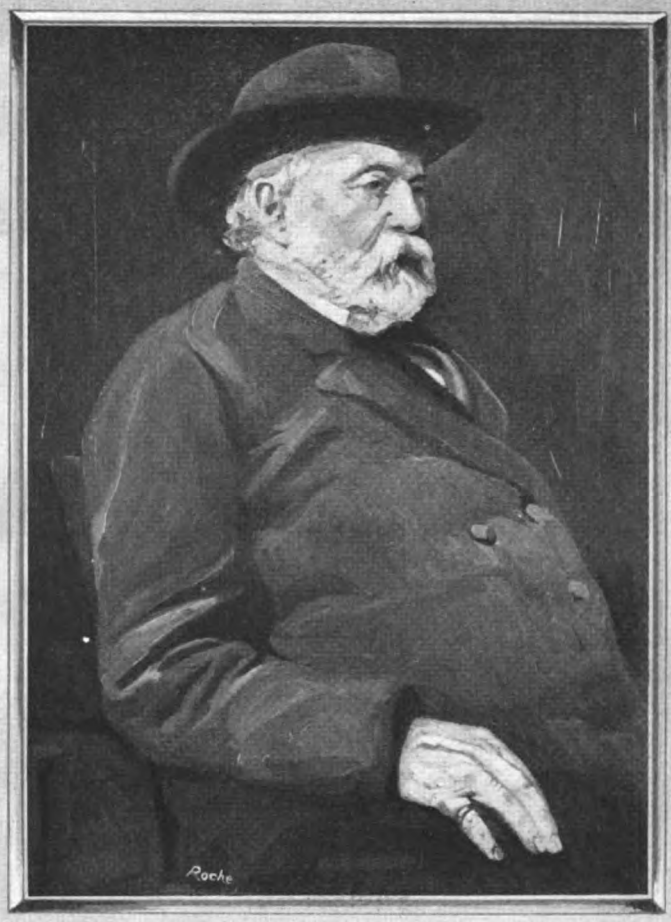
Trade Mark

"U.S." PROTECTIVE RUBBER SLEEVES for marine propeller shafts

Merchant Steel Vessels Over 100 Tons Under Construction in American Shipyards During 1926

Vessel	Yard	Type	Class	Gross	Owners	Mach.	H.P.	Len. ft. in.	Brdt. ft. in.	Dep. ft. in.	Fuel	Remarks	Status
A. F. Harvey	Great Lakes Eng. Works	Cargo	Lakes	7800	Pittsburgh S. S. Co.	Recip.	2200	604	60	32	Coal	Great Lakes Bulk Freighter	Under con.
Algonquin	Newport News S. B. Co.	Pass.	Ocean	6000	Clyde Steamship Co.	Turbine	4200	402	55	31 6	Oil	New York-Florida Service	Completed
American Legion	Staten Island S. B. Co.	Ferry	River	2089	City of New York	Recip.	4000	264	66	17 9	Oil	Municipal Ferry Service	Completed
Associates	Union Plant, Beth. S. B.	Tanker	Harbor	526	Associated Oil Co.	Oil Eng.	220	166 11	38	9 6	Oil	San Francisco Bay	Completed
Belfont	Marietta Mfg. Co.	T. Boat	Rivers	160	Ind. Belfont Transp. Co.	Oil Eng.	360	120	24	4 4	Oil	River Towing Stern W	Completed
B. M. Thomas	New London S. & E. Co.	T. Boat	Harbors	140	Hainesport M. & T. Co.	Oil Eng.	500	....	....	....	Oil	Towing-Phila. Harbor	Completed
Buffalo	Staten Island S. B. Co.	Gr. El.	Harbor	300	International Elev. Co.	Oil Eng.	800	130	35	16	Oil	New York Harbor	Under con.
California	Newport News S. B. Co.	Pass.	Ocean	20400	American Line S. S. Corp.	Turb. Elec.	13500	601 3	80	52	Oil	N. Y.-Panama-Pacific	Under con.
Cape May	Harlan Plant, Beth. S. B.	Ferry	Harbor	1028	Phila. & Reading R. R.	Recip.	1200	200	36	16	Coal	Harbor Ferry Service	Completed
Caracas	Newport News S. B. Co.	Pass.	Ocean	3200	Red D. Line	Turbine	3500	335 4	51	22	Oil	New York-Venezuela	Under con.
Carl E. Bradley	American Ship. B. Co.	Cargo	Lakes	9500	Bradley Transp. Co.	Turb. Elec.	4800	638	65	33	Coal	Self Unloader Great Lakes	Under con.
Cascajales	Sun S. B. & D. D. Co.	T. Boat	Rivers	443	Int. Petrol. Co.	Recip.	750	166	44	5	Oil	So. American Service	Completed
Charles C. Donoghue	Fore River Plant, Beth.	Ferry	Harbor	684	City of Boston	Recip.	950	174 4	40 8	16 6	Coal	Harbor Service	Completed
Charles W. Culkin	Am. Brown Boveri Corp.	Ferry	Harbors	405	Elec. Ferries, Inc.	Oil Elec.	700	155	48 6	14 3	Oil	Autos—North River	Completed
Chatham	Newport News S. B. Co.	Pass.	Ocean	5649	Merchants & Miners	Recip.	2700	368	52	36	Oil	Pass. Service Coastwise	Completed
City of Keansburg	Harry A. Marvel	Pass.	Bay	1037	Keansburg Steamboat Co.	Recip.	750	241 7	36	12 6	Oil	Pass. Service—N. Y.	Completed
City of Pittsburgh	American Bridge Co.	T. Boat	Rivers	578	Carnegie Steel Co.	Recip.	1400	171 10	38 10	6 4	Coal	River Towing Stern W	Completed
Col. James Picklands	American S. B. Co.	Cargo	Lakes	8151	Interlake Steamship Co.	Recip.	2200	600	60	32	Coal	Great Lakes Bulk Freighter	Completed
Crest	Amer. Brown Boveri Corp.	Dredge	Coast	1200	Gr. Lakes Dredge & D. Co.	Oil Elec.	.....	167	48	14	Oil	Dredge—Coast and Lakes	Completed
Dan Hardie	Spedden S. B. Co.	Ferry	Harbors	259	Peninsula Terminal Co.	Oil Eng.	360	....	....	....	Oil	Ferry-Miami Fla.	Completed
Daniel A. MacCormack	Fore River Plant, Beth.	Ferry	River	684	City of Boston	Recip.	950	174 4	40 8	16 6	Coal	Harbor Service	Completed
Daniel McCool	Manitowoc S. B. Corp.	Cargo	Lakes	649	Cement Transit Co.	Oil Eng.	480	152	33	15	Oil	Cement Carrier	Completed
Delaware No. 2	Sun S. B. & D. D. Co.	Dredge	Coast	....	American Dredg. Co.	Oil Eng.	800	110	31 10	10	Oil	Coast and Harbor Dredging	Completed
Delta King	California Transp. Co.	Pass.	Rivers	1837	Calif. Transp. Co.	Recip.	2000	....	....	....	Oil	Sacramento-San Francisco	Completed
Diamond S No. 87	Federal S. B. & D. D. Co.	Lighter	Harbors	449	Wm. Spencer & Sons	Recip.	900	110	32	16	Coal	Harbor Lighterage	Completed
Diamond S. No. 88	Federal S. B. & D. D. Co.	Lighter	Harbors	449	Wm. Spencer & Sons	Recip.	900	110	32	16	Coal	Harbor Lighterage	Completed
Dixie	Federal S. B. & D. D. Co.	Pass.	Ocean	8000	Southern Pac. S. S. Lines	Turbine	7100	445	60	37	Oil	Pass. & Freight Coastwise	Under con.
Dorchester	Newport News S. B. Co.	Pass.	Ocean	5649	Merchants & Miners Co.	Recip.	2700	368	52	36	Oil	Pass. Service Coastwise	Completed
Duncan Bruce	Chas. Ward Eng. Works	T. Boat	Rivers	330	Kelly Axe & Tool Co.	Oil Eng.	720	135	35	6	Oil	River Towing	Under con.
E. D. Kenna	Chas. Ward Eng. Works	T. Boat	Rivers	388	Ohio River Co.	Recip.	700	145	32	6 6	Coal	River Towing	Completed
Elmer W. Jones	New London Ship & E. Co.	Ferry	Lakes	277	Brock & Morris Trans. Co.	Oil Eng.	300	125	37	10	Oil	Pass. & Auto Service	Completed
Essex	Great Lakes Eng. Wks.	Ferry	Lakes	266	Walkerville & Det. Fer. Co.	Recip.	500	105	36	12 6	Coal	Ferry—Walkerville & Detroit	Completed
Evangeline	Wm. Cramp S. & E. B. Co.	Pass.	Ocean	4800	Eastern S. S. Co.	Turbine	7500	379 3	55 6	29 6	Oil	New York-Yarmouth	Under con.
Fairfax	Newport News S. B. Co.	Pass.	Ocean	5649	Merchants & Miners Co.	Recip.	2700	368	52	36	Oil	Pass. Service Coastwise	Completed
Fishers Island	Harlan Plant, Beth. S. B.	Ferry	Sound	862	Fishers Island Nav. Co.	Recip.	750	150	40	15 6	Coal	Passenger and Automobiles	Completed
Frank M. Gannett	Am. Brown Boveri Corp.	Ferry	Harbors	405	Elec. Ferries Inc.	Oil Elec.	700	155	48 6	14 3	Oil	Autos—North River	Completed
Frederick Peirce	Am. Brown Boveri Corp.	Ferry	Harbors	405	Elec. Ferries Inc.	Oil Elec.	700	155	48 6	14 3	Oil	Autos—North River	Completed
Fresno	Union Plant, Beth. S. B.	Ferry	Harbors	...	Southern Pacific [illegible]	Oil Elec.	1800	256	46 3	19 6	Oil	San Francisco Bay	Under con.
General	Union Plant, Beth. S. B.	Tanker	Rivers	560	Gen. Petroleum [illegible]	Oil Elec.	500	176 6	32	14	Oil	San Francisco Bay	Completed
George M. Humphrey	American Ship. B. Co.	Cargo	Lakes	7950	Kinsman Transit [illegible]	Recip.	2200	600	60	32	Coal	Bulk Cargo Great Lakes	Under con.
George W. Miller	Howard Ship Yd. & Dk. Co.	Ferry	Rivers	223	Miss. River Ferr [illegible]	Recip. S.W.	350	....	....	....	Coal	Ferry Service	Completed
Governor Carr	Fore River Plant, Beth.	Ferry	Harbors	413	Jamestown-New[illegible] F. Co.	Recip.	450	150 1½	38	14	Coal	Harbor Service	Completed
Governor Moore	Am. Brown Boveri Corp.	Ferry	Harbors	405	Elec. Ferries Inc.	Oil Elec.	700	155	48 6	14 3	Oil	Autos—North River	Completed
Grand Rapids	Manitowoc S. B. Corp.	Ferry	Lakes	2942	Grand Trunk Rai[illegible]oad	Recip.	2700	360	56	21 6	Coal	Car Ferry-Lake Michigan	Completed
Grenville Kane	Am. Brown Boveri Corp.	Ferry	Harbors	405	Electric Ferries Inc.	Oil Elec.	700	155	48 6	14 3	Oil	Autos—North River	Completed
Gulfcrest	Am. Brown Boveri Corp.	Tanker	Ocean	8952	Gulf Refining Co.	Oil Eng.	3000	479 3	65	38 4	Oil	Ocean Tanker	Completed
Gulfpride	Federal S. B. & D. D. Co.	Tanker	Ocean	12500	Gulf Refining Co.	Oil Eng.	4000	543	74	40 6	Oil	Ocean Tanker	Completed
Gulfpride	Sun S. B. & D. D. Co.	Tanker	Coast	376	Gulf Refining Co.	Oil Eng.	400	142	27	11 6	Oil	Gulf Coast Service	Under con.
Gulfspray	Sun S. B. & D. D. Co.	Tanker	Coast	376	Gulf Refining Co.	Oil Eng.	400	142	27	11 6	Oil	Gulf Coast Service	Under con.
Harry Coulby	American Ship B. Co.	Cargo	Lakes	9200	Interlake Steamship Co.	Recip.	2900	630	65	33	Coal	Bulk Cargo Great Lakes	Under con.
Harvard	Rice Bros. Corp.	Trawler	Ocean	346	Whitman, Ward & Lee Co.	Recip.	550	152	24	13	Coal	Deep Sea Fishing	Completed
Highway	Canulette S. B. Co.	Ferry	Rivers	147	At New Orleans	Oil Eng.	120	....	....	....	Oil	Mississippi River	Completed
Howard S. Gerken	At Buffalo	Cargo	Lakes	1322	At Buffalo	Recip.	1500	....	....	....	Coal	Great Lakes Cargo	Completed
H. S. Chamberlain	Ayer & Lord, Paducah	T. Boat	Rivers	169	Roan Iron Co., Choatt.	Recip.	500	....	....	....	Coal	River Towing—Stern W	Completed
Hull No. 6	Union Plant, Beth. S. B.	Ferry	Harbors	....	Southern Pacific Co.	Oil Elec.	1800	256	46 3	19 6	Oil	San Francisco Bay	Under con.
Hull No. 104	Sun S. B. & D. D. Co.	Tanker	Ocean	8800	Tidewater Oil Co.	Recip.	4500	497	65 9	37	Oil	Tanker Ocean	Under con.
Hull No. 105	Sun S. B. & D. D. Co.	Tanker	Coast	1213	Sun Oil Co. Inc.	Oil Eng.	720	253 6	40	15	Oil	Bay and River Service	Under con.
Hull No. 159	Marietta Mfg. Co.	T. Boat	Rivers	615	Mar[illegible]	[illegible]p.	1000	180	36	6 6	Coal	River Towing	Under [illegible]

Hull No. 177	Toledo S. B. Co., Inc.	Ferry	Lakes	3000	Wabash Railway Co.	Recip.	3000	380		57 6	21 6	Coal	Carferry Great Lakes	Under con.
Hull No. 178	Toledo S. B. Co., Inc.	Cargo	Lakes	8000	Pittsburgh S. S. Co.	Recip.	2500	604		60	32	Coal	Bulk Cargo-Great Lakes	Under con.
Hull No. 202	Marietta Mfg. Co.	T. Boat	Rivers	560	Ferrocarril de Antioquia	Recip.	600	192		42	5	Oil	River Towing	Under con.
Hull No. 256	Great Lakes Eng. Works	Cargo	Lakes	6000	Huron Transp. Co.	Recip.	2000	400		60	29	Coal	Self Unloader	Under con.
Hull No. W-562-K	Dravo Contracting Co.	T. Boat	Rivers	215	Keystone Sand & Sup. Co.	Oil Eng.	480	110		26	5	Oil	River Towing	Under con.
Hull No. W-562-L	Dravo Contracting Co.	T. Boat	Rivers	215	LaBelle Transp. Co.	Oil Eng.	480	110		26	5	Oil	River Towing	Under con.
Hull No. W-608	Dravo Contracting Co.	Dredge	Rivers	200	Ohio River Gravel Co.	Recip.	....	120		32	6	Coal	River Dredging	Under con.
Iroquois	Newport News S. B. Co.	Pass.	Ocean	6500	N. Y. & Miami S. S. Corp.	Turbine	8500	407	3	62	30 6	Oil	New York-Florida Service	Completed
John Cadwalader	Pusey & Jones	Pass.	Bays	1478	Ericsson Line	Recip.	1700	230		45	15 10	Oil	Baltimore-Philadelphia	Completed
John S. Collins	New London S. & E. Co.	Ferry	Harbors	265	At Miami	Oil Eng.	300	....		....	....	Oil	Miami Service	Completed
L. E. Block	American Ship B. Co.	Cargo	Lakes	8950	Inland Steamship Co.	Recip.	2500	620		64	32	Coal	Bulk Cargo Great Lakes	Under con.
Louisiana	Howard Ship Yd. & Dk. Co.	Ferry	Rivers	435	Baton Rouge Trans. Co.	Recip.	500	150		64	9	3½	Coal	Catamaran Ferry	Completed
Madison	Manitowoc S. B. Corp.	Ferry	Lakes	2942	Grand Trunk Railroad	Recip.	2700	360		56	21 6	Coal	Carferry-Lake Michigan	Completed
Malolo	Wm. Cramps S. & E. B. Co.	Pass.	Ocean	17200	Matson Navigation Co.	Turbine	25000	582		83	44 6	Oil	San Francisco - Hawaii	Under con.
Manitowoc	Manitowoc S. B. Corp.	Ferry	Lakes	3093	Wabash Railroad Co.	Recip.	5200	370		65	21 6	Coal	Railroad Car Ferry	Completed
M. E. Norman	Morgan City, La.	T. Boat	Rivers	148	M. E. Norman Co.	Recip.S.W.	1000	....		....	....	Coal	River Towing	Completed
Meitowax	Staten Island S. B. Co.	T. Boat	Harbors	242	Long Island R. R. Co.	Oil Elec.	800	108		26	13 3	Oil	Shifting Tug N. Y. Harbor	Completed
Mohawk	Newport News S. B. Co.	Pass.	Ocean	5896	Clyde Steamship Co.	Turbine	4200	402		54	31 6	Oil	N. Y.-Carolina-Florida	Completed
Nashville B	Nashville Bridge Co.	T. Boat	Rivers	236	Nashville Bridge Co.	Oil Eng.	400	131		28	5 3	Oil	River Towing-Stern W	Completed
Newton	Harlan Plant, Beth. S. B.	Tug	Harbors	195	D. L. & W. Railroad	Recip.	900	100		25	13 3	Coal	Shifting Tug N. Y. Harbor	Completed
Northland	Newport News S. B. Co.	C. G. C.	Coast	...	U. S. Engineers	Oil Elec.	1200	216	6	39	24 9	Oil	Coast Guard	Under con.
N. Y. Central No. 33	Staten Island S. B. Co.	T. Boat	Harbors	242	N. Y. Central Railroad	Oil Elec.	800	108		26	13 3	Oil	Shifting Tug N. Y. Harbor	Completed
N. Y. Central No. 34	Staten Island S. B. Co.	T. Boat	Harbors	242	N. Y. Central Railroad	Oil Elec.	800	108		26	13 3	Oil	Shifting Tug N. Y. Harbor	Completed
Palmetto	Charleston D. D. & M. Co.	Ferry	Harbors	258	Cooper River Ferry Co.	Oil Eng.	360	....		....	....	Oil	Ferry Service Charleston	Completed
Patricia Barrett	Howard Ship Yd. & Dk. Co.	T. Boat	Rivers	360	The Barrett Line	Recip.	1100	190		40	6	Coal	River Towing	Completed
Penna. R. R. No. 15	Newport News S. B. Co.	Drill B.	Harbor	95	Penna. Railroad	Oil Elec.	150	80		19	12 10	Oil	Service N. Y. Harbor	Completed
Penna. R. R. No. 20	Newport News S. B. Co.	T. Boat	Harbor	186	Penna. Railroad	Oil Elec.	750	105		24	14	Oil	Float Towing	Completed
Penna. R. R. No. 26	Newport News S. B. Co.	T. Boat	Harbor	186	Penna. Railroad	Oil Elec.	750	105		24	14	Oil	Float Towing	Completed
Peralta	Moore Dry Dock Co.	Ferry	Harbors	...	Key System Transit Co.	Turb. Elec.	3600	276		47	21	Oil	East Bay-San Francisco	Completed
Peter Stuyvesant	Pusey & Jones Corp.	Pass.	Rivers	1860	Hudson River Day Line	Recip.	2700	268	6	46	17 3	Oil	Pass. Hudson River	Under con.
Philadelphia	Harlan Plant, Beth. S. B.	Ferry	Harbors	1028	Phila. & Reading R. R. Co.	Recip.	1200	200		36	16	Coal	Harbor Ferry Service	Completed
Pilgrim	Howard Ship Yd. & Dk. Co.	Ferry	Rivers	130	Tri-State Ferry Co.	Oil Eng.	180	130		30	5	Oil	River Ferry Service	Completed
Port Houston	Harlan Plant, Beth. S. B.	Fireboat	Harbor	380	Port of Houston	Oil Elec.	720	125	10	27	14	Oil	Harbor Service	Completed
Pullen	Amer. Brown Boveri Corp.	Dredge	Harbors	700	United States Army	Oil Elec.	....	130		33	8	Oil	Harbor and River	Completed
Raymond	Newport News S. B. Co.	Dredge	Harbors	1000	U. S. Engineers	Oil Elec.	....	227	10½	40	13	Oil	Dredging	Completed
Richlube	Beth. S. B., Union Plant	Tanker	Bay	609	Richfield Oil Co., Inc.	Oil Elec.	500	187		32	14	Oil	Bay Tanker	Completed
Robert Hobson	American S. B. Co.	Cargo	Lakes	8024	Interlake S. S. Co.	Recip.	2200	600		60	32	Coal	Bulk Cargo Great Lakes	Under con.
Samson	Spedden S. B. Co.	Tug	Harbors	138	G. F. Pettinos	Oil Eng.	400	87		21	11 6	Oil	Shifting Tug Baltimore Har.	Completed
Samuel Mather	American Ship B. Co.	Cargo	Lakes	8151	Interlake Steamship Co.	Recip.	2200	600		60	32	Coal	Great Lakes Bulk Freighter	Completed
Shawnee	Newport News S. B. Co.	Pass.	Ocean	6500	N. Y. & Miami S. S. Corp.	Turbine	8500	407	3	62	30 6	Oil	New York-Florida Service	Completed
Steel Chemist	Federal S. B. & D. D. Co.	Cargo	Lakes	1695	U. S. Steel Products Co.	Oil Eng.	950	257	7¾	42 9	20	Oil	Gt. Lakes-St. Lawrence	Completed
Steel City	Marietta Mfg. Co.	T. Boat	Rivers	350	Steel City Navig. Co.	Recip.	750	164		30	5 2	Coal	River Towing	Completed
Steel Electrician	Federal S. B. & D. D. Co.	Cargo	Lakes	1695	U. S. Steel Products Co.	Oil Elec.	750	257	7¾	42 9	20	Oil	Gt. Lakes-St. Lawrence	Completed
Stockton	Union Plant, Beth. S. B.	Ferry	Harbors	...	Southern Pacific Co.	Oil Elec.	1800	256		46 3	19 6	Oil	San Francisco Bay	Under con.
Sunoco	Sun S. B. & D. D. Co.	Tanker	Bay	1213	Sun Oil Co., Inc.	Oil Eng.	720	253	6	40	15	Oil	Bay & River Service	Completed
Sunoco Jr.	Sun S. B. & D. D. Co.	Tanker	Rivers	120	Peninsula Trans. Co.	Oil Eng.	125	98		19	9	Oil	Harbor Service	Completed
Sunoco No. 4	Sun S. B. & D. D. Co.	Tanker	Rivers	275	Sun Oil Co.	Oil Eng.	175	140		22 6	11 6	Oil	Harbor Service	Completed
Stroudsburg	Harlan Plant, Beth. S. B.	Tug	Harbors	195	D. L. & W. Railroad	Recip.	900	100		25	13 3	Coal	Shifting Tug N. Y. Harbor	Completed
Tahoe	Union Plant, Beth. S. B.	Ferry	Harbors	...	Southern Pacific Co.	Oil Elec.	1800	256		46 3	19 6	Oil	San Francisco Bay	Under con.
Tydol	Sun S. B. & D. D. Co.	Tanker	Rivers	1250	Tidewater Oil Co.	Oil Eng.	700	260	10¼	40	14	Oil	River, Canal, Bay	Under con.
Unknown	Howard Ship Yd. & Dk. Co.	Ferry	Rivers	125	Tri-State Ferry Co.	Oil Eng.	180	120		30	5	Oil	River Ferry Service	Under con.
Valencia	Elizabeth City, N. C.	Cargo	Harbors	114	Miles L. Clark	Oil Eng.	120	....		....	....	Oil	Frt. Elizabeth City-N. C.	Completed
W. A. Baldwin	Am. Brown Boveri Corp.	Ferry	Rivers	405	Elec. Ferries Inc.	Oil Elec.	700	155		48 6	14 3	Oil	Autos-North River	Completed
W. A. Shepard	Chas. Ward Eng. Works	T. Boat	Rivers	236	Kelly Axe & Tool Co.	Oil Eng.	720	125		25	7	Oil	River Towing	Under con.
Wayne	Great Lakes Eng. Wks.	Ferry	Lakes	371	Walkerville & Det. Fer. Co.	Recip.	800	140		45	14 8	Coal	Ferry-Walkerville & Detroit	Completed
Wicomico	Sun S. B. & D. D. Co.	T. Boat	Harbor	225	Penna. Railroad	Oil Elec.	600	116		24	13 8	Oil	Shifting Tug N. Y. Harbor	Completed
Willets Point	Federal S. B. & D. D. Co.	Dredge	Harbors	1164	U. S. Engineers	Oil Eng.	1000	200		41	19 6	Oil	Harbor Dredging	Completed
Wm. A. Lydon	Manitowoc	T. Boat	Lakes	194	Grt. Lakes D. & D. Co.	Oil Eng.	720	108		26	14 3	Oil	Towing, Great Lakes	Completed
Wm. McLauchlan	American Ship B. Co.	Cargo	Lakes	8024	Interlake S. S. Co.	Recip.	2200	600		60	32	Coal	Bulk Cargo Great Lakes	Under con.
Yarmouth	Wm. Cramp S. & E. B. Co.	Pass.	Ocean	4800	Eastern S. S. Co.	Turbine	7500	379	3	55 6	29 6	Oil	Boston to Yarmouth	Under con.
Yerba Buena	Moore Dry Dock Co.	Ferry	Harbors	...	Key System Transit Co.	Turb. Elec.	3600	276		47	21	Oil	East Bay, San Francisco	Under con.



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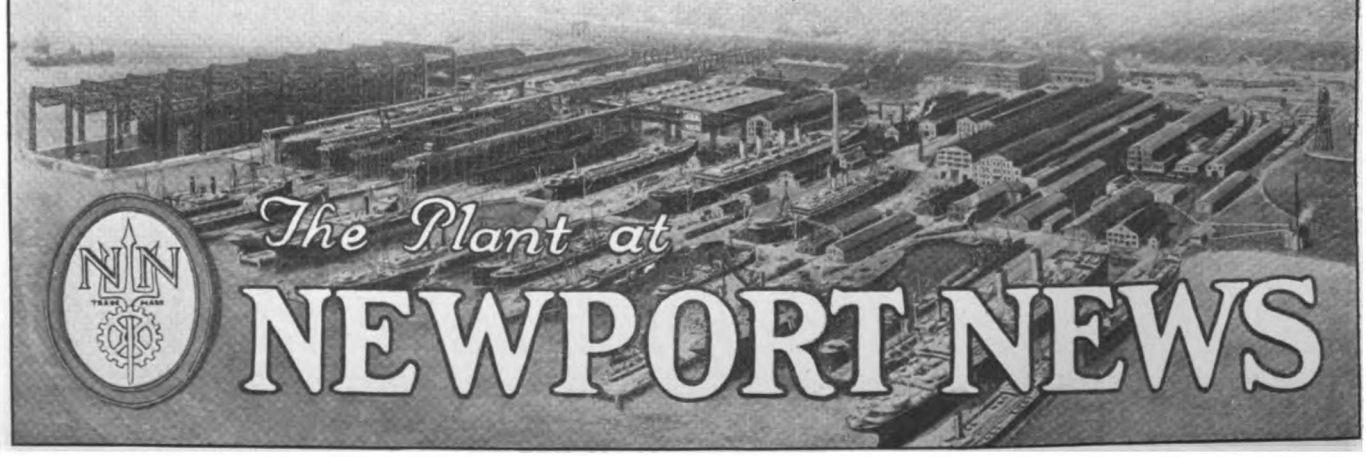
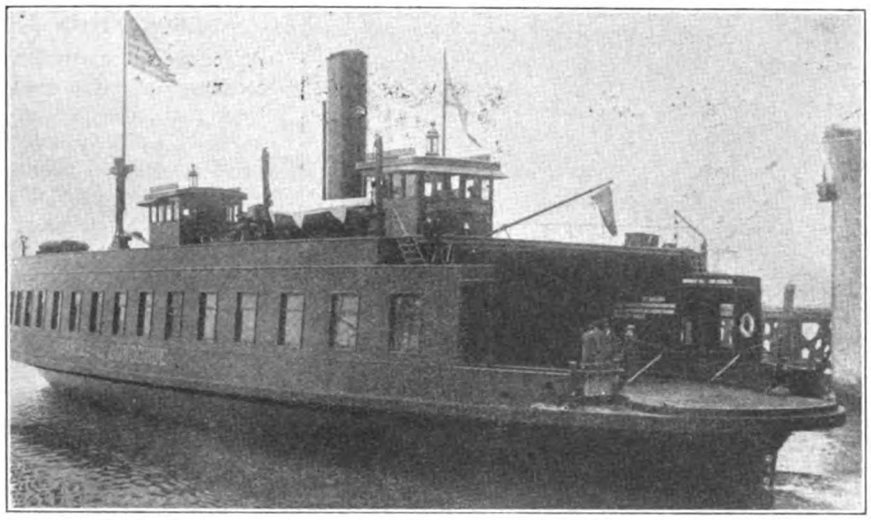


CHARLES C. DONOGHUE—Ferry—Double Ended—Screw Steamer



DESCRIPTION

Two ferry boats of this type were constructed during 1926 by the Fore River plant of the Bethlehem Shipbuilding Corp. for the City of Boston for service between Boston and East Boston. They are designed primarily for the heavy trucking traffic of the water fronts. In addition they also have comfortable side cabins for passengers.

Names—CHARLES C. DONOGHUE and DANIEL A. MACCORMACK

Owner—City of Boston

Builder—Beth. S. B. Corp., Fore River Plant

Naval Architect—Div. of Ferries, Boston

Launched—CHARLES C. DONOGHUE, Sept. 11, 1926; DANIEL A. MACCORMACK, Oct. 9, 1926

Completed—CHARLES C. DONOGHUE, Sept. 23, 1926; DANIEL A. MACCORMACK, Oct. 21, 1926

Classification—American Bureau of Shipping. Class, A-1E for ferry service.

HULL PARTICULARS

Length overall, (guards) 174 feet 4 inches; length between perpendiculars, (post to post) 146 feet 9 inches; breadth molded, 40 feet 8 inches; depth molded, 16 feet 6 inches; draft, light, 10 feet 6 inches; displacement light, 892 tons; gross tonnage, 684; net tonnage, 514; passenger capacity, 414; bunker fuel capacity, 25 tons; speed, 12½ statute miles per hour.

MACHINERY PARTICULARS

Main Engines—Two compound expansion steam engines built by Fore River plant Beth. S. B. Corp.; size, 15 x 30 inches and 24-inch stroke. Vertical inverted cylinders.

Boilers—Number two; of scotch type; built by the Harlan plant of the Beth. S. B. Corp.; size, 11 feet in diameter x 13 feet long; working pressure, 150 pounds per square inch; fuel, coal.

AUXILIARY EQUIPMENT

Manufacturers of:

Pumps—Warren and Beth. S. B. Corp.

Steering Engine—Moore plant, Beth. S. B.

Propellers—Bethlehem S. B. Corp.

Condensers—Warren Steam Pump Co.

Thrust Bearings—Kingsbury.

Turbines for Fire Pumps—B. F. Sturtevant.

Electric Generators—Westinghouse.

Fire Extinguishers—Bethlehem S. B. Corp.

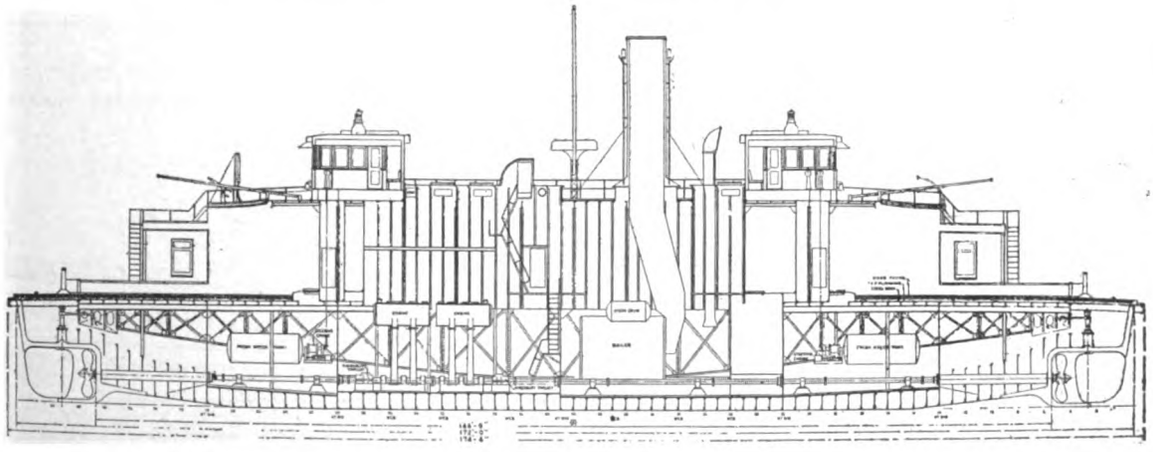
Emergency Lighting—Storage batteries.

Feed Water Heater—Griscom-Russell.

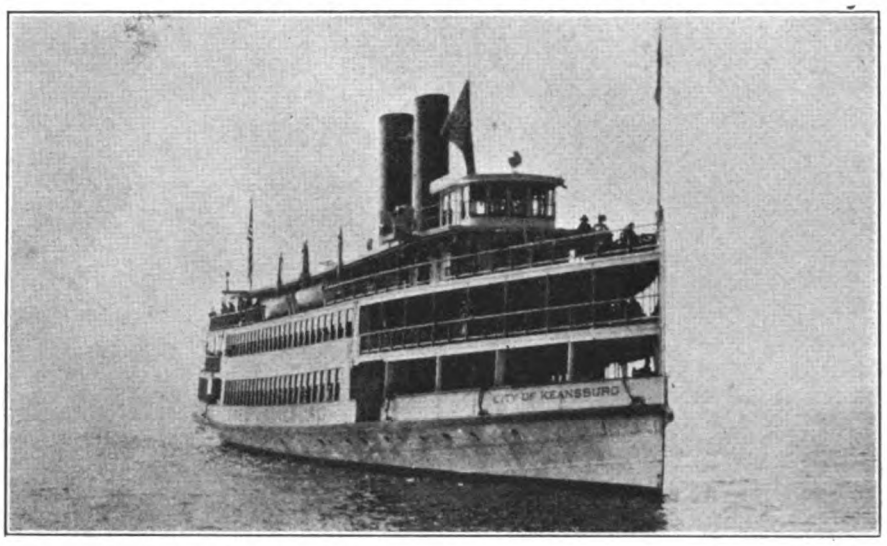
Valves—Crane Co.

Soot Blowers—Diamond Power.

These ferry boats were both built under the special survey of the American bureau of shipping and also to comply with the rules and regulations of the United States steamboat inspection service.



CITY OF KEANSBURG—Excursion—Twin Screw Steamer



DESCRIPTION

A modern excursion steamer of improved type with a passenger capacity of 2300 built at the Marvel Shipyard, Newburgh, N. Y., for the Keansburg Steamboat Co. Her regular run is between the Battery, N. Y., and Keansburg N. J. A spacious dancing floor enclosed in a steel house is located aft on the main deck with staircase to a completely equipped cafeteria below.

Name—CITY OF KEANSBURG
Owner—Keansburg Steamboat Co.
Builder—Marvel Shipyard
Naval Architect—Townsend J. Smith
Completed—1926
Classification—

HULL PARTICULARS

Length overall, 241 feet, 7 inches; length between perpendiculars, 230 feet; breadth extreme, 43 feet, at waterline, 36 feet; depth molded, 12 feet, 6 inches; draft mean, 7 feet 9 inches; gross tonnage, 1037; net tonnage, 551; passenger capacity, 2300; fuel oil capacity, 80 tons; speed per hour, 18 statute miles.

MACHINERY PARTICULARS

Main Engines—Two, 3-cylinder triple expansion steam engines; size, 15½ x 26 x 44 inches and 26-inch stroke, driving twin propellers. Total horsepower, 1500 to 1800.

Boilers—Two watertube boilers of shipping board type, each of 2518 square feet heating surface. Each boiler is fitted with a Power Specialty Co. Foster superheater of 400 square feet surface and Diamond soot blower. Steam at 200 pounds working pressure. Boilers are fitted with Coen Co. oil burning equipment.

AUXILIARY EQUIPMENT

Manufacturers of:

Pumps—Bethlehem, Worthington, Buffalo
Feed Heater—Reilly-Griscom-Russell Co.
Windlass—Hyde Windlass Co.
Steering Engine—Bethlehem S. B. Corp.
Capstan—Hyde Windlass Co.
Lighting and Int. Communications—Cory
Generators—Two 10 k.w. Engberg
Propellers—Four bladed, semisteel

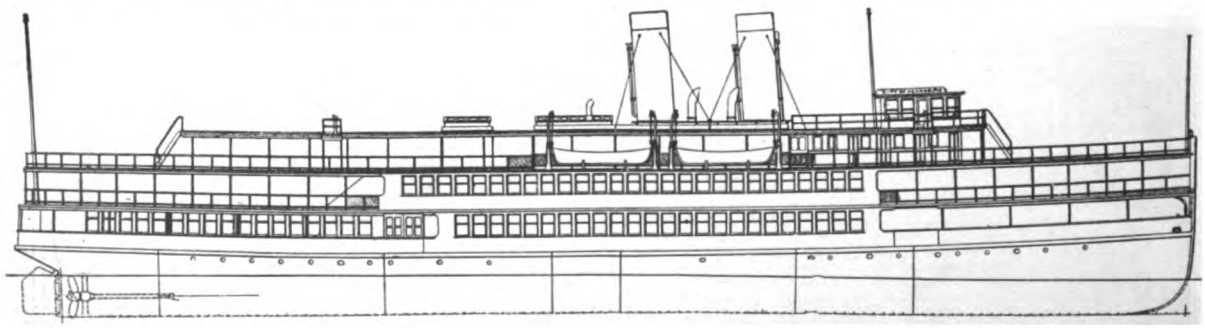
The main deck is completely plated and is covered with asbestolith within the house including the dance hall. Saloon, boat and shade decks are of joiner construction, canvas covered where exposed. Haskelite has been used for sheathing in way of the dance hall as well as in other portions of accommodations.

Sliding sash windows of large number have been fitted materially adding to comfort in inclement and in fine weather as protection is provided in the one case while maximum air and ventilation is possible in the other.

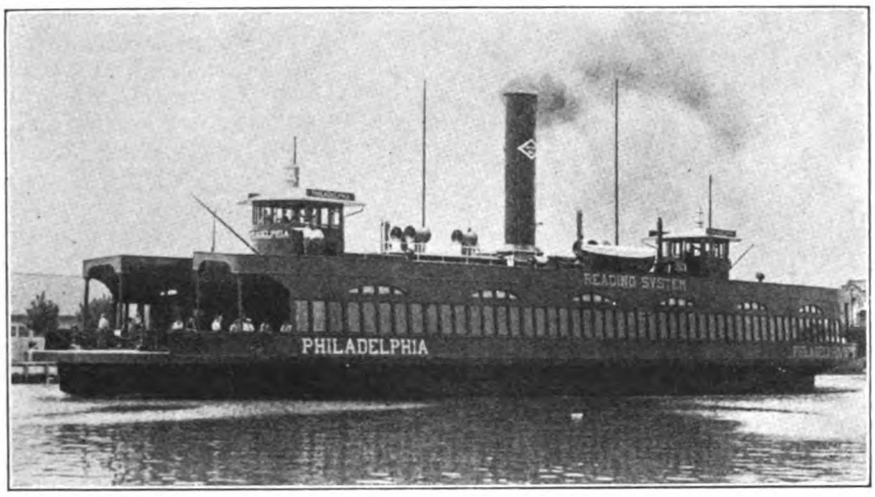
The hull of steel with single bottom is fitted with six watertight and two oiltight transverse bulkheads into nine spaces.

Fuel oil is carried in two tanks, one each side of the centerline bulkhead between the engine and boiler rooms. These tanks are 14 feet long and 9 feet wide transversely from the centerline port and starboard.

The tanks outboard of the fuel oil tanks are used as listing or transverse trimming tanks.



PHILADELPHIA—Double Ended Ferry—Screw Steam



DESCRIPTION

This ferryboat, in conjunction with its sister boat, the CAPE MAY is now being used for automobile and passenger ferry service between the Chestnut street wharf of the Reading system in Philadelphia and Kaighns Point, Camden, N. J., making connections there with the Reading railroad terminal for points in South Jersey and Atlantic shore resorts.

Name—PHILADELPHIA

Owner—Delaware River Ferry Co.

Builder—Beth. S. B. Corp., Harlan Plant

Launched—PHILADELPHIA, May 1, 1926, sister boat CAPE MAY, March 18, 1926.

Completed—PHILADELPHIA, July 23, 1926, CAPE MAY, June 3, 1926.

Classification—Equal to Bureau Veritas

HULL PARTICULARS

Length overall, 200 feet; length between perpendiculars, 167 feet; breadth molded, 36 feet; depth molded, 16 feet; draft, 10 feet; gross tonnage, 1028; net tonnage, 695; bunker fuel capacity, 22 tons of coal; speed, 12.69 miles per hour.

MACHINERY PARTICULARS

Main Engine—One double compound reciprocating engine coupled to continuous through shafting with a propeller at each end; size, 17 x 34 x 34 x 17 inches x 24-inch stroke; built by Harlan plant, Bethlehem Shipbuilding Corp. Ltd.

Boilers—Two gun boat type; size, 11 feet in diameter x 20 feet 10⅛ inches long; built by Harlan plant, Bethlehem Shipbuilding Corp. Ltd.; fuel, coal.

AUXILIARY EQUIPMENT

Manufacturers of:

Pumps—Warren Steam Pump Co.

Steering Engine—American Engineering Co.

Propellers—Two cast steel

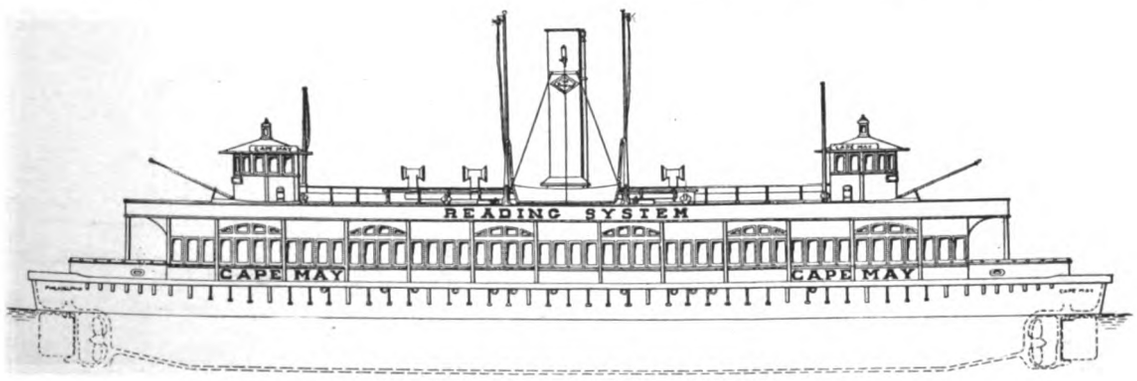
Electric Generators—Two 10 k. w. General Electric

Telegraphs—Chas. Cory & Son Inc.

The two ferries, PHILADELPHIA and CAPE MAY, built for the Reading railroad system by the Harlan plant, of similar construction throughout are now in use in the passenger, automobile and truck traffic between the Chestnut street wharf, Philadelphia and the Reading terminal at Kaighns Point, Camden, N. J.

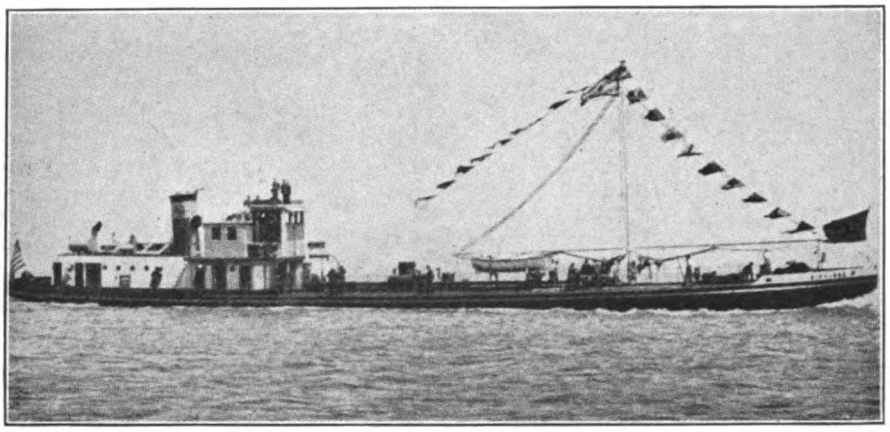
These ferries are as nearly fireproof as it is practicable to build them. The main deck has a driveway through the center of the vessel from end to end with a narrow machinery casing dividing it amidships. Maximum space is thus provided for vehicular traffic. The passenger cabins are also located on this deck, on either side, outboard of the driveways.

Five watertight steel bulkheads extending from the keel to the main deck divide the steel hull into six watertight compartments.



Outboard profile of new Reading ferryboats

RICHLUBE—Tanker—Single Screw—Diesel Electric



DESCRIPTION

The Richfield Oil Co. diesel electric tanker, RICHLUBE was built early in 1926 by the Bethlehem Shipbuilding Corp., Union Plant. This vessel is now in service in and around San Francisco bay and is one of the most up-to-date vessels of her type. She is propelled by an electric motor.

Name—RICHLUBE
Owner—Richfield Oil Co.
Builder—Bethlehem S. B. Corp., Union Plant
Naval Architect—Union Plant, Beth. S. B. Corp.
Launched—March 15, 1926
Completed—May 19, 1926
Classification—American Bureau of Shipping

HULL PARTICULARS

Length overall, 187 feet; length between perpendiculars, 180 feet 6 inches; breadth molded, 32 feet; depth molded, 14 feet; draft loaded, 12 feet 6inches; displacement loaded, 1590 tons; gross tonnage 609; net tonnage, 390; cargo capacity, 7050 barrels, or 295,700 gallons; bunker fuel capacity, 26 tons; speed, 8½ knots.

MACHINERY PARTICULARS

Main Engines—Two, 6-cylinder 4 cycle solid injection diesel engines; builder, Atlas Imperial Co.; 250 brake horsepower each.

Main Generators—Two, of 145 kilowatts each, with 20-kilowatt exciter attached; built by Westinghouse Electric & Mfg. Co.

Propulsion Motor—One, double armature, direct current of 350 shaft horsepower at 160 revolutions per minute; built by Westinghouse Electric & Mfg. Co.

Aux. Engine—One, gasoline engine set of 1500 watts; built by Westinghouse.

AUXILIARY EQUIPMENT

Manufacturers of:

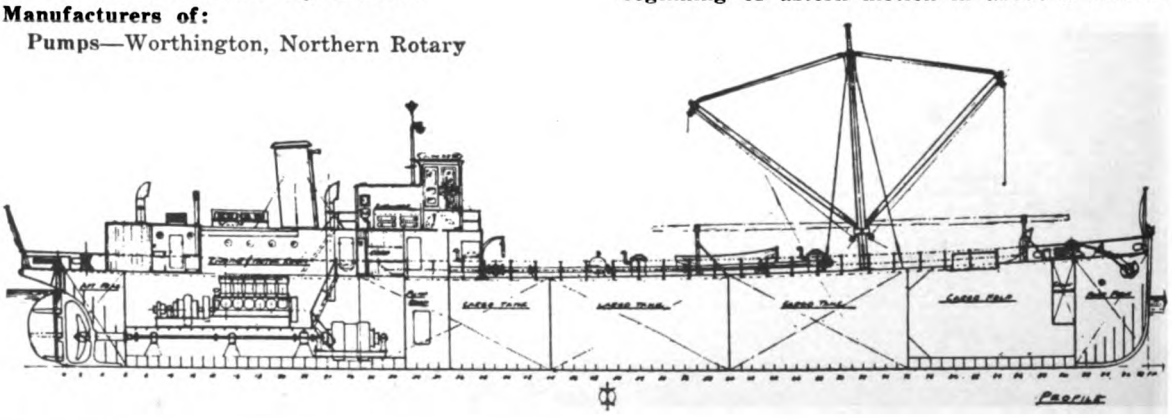
Pumps—Worthington, Northern Rotary
Windlass—Allan Cunningham
Winches—Allan Cunningham
Steering Engine—Allan Cunningham
Propeller—Bethlehem Shipbuilding Corp.
Electric Generators—Westinghouse Electric

The diesel electric tanker RICHLUBE is built of steel on the transverse system of framing and to the American Bureau's requirements for tank vessels in coastwise, harbor, bay, and river service.

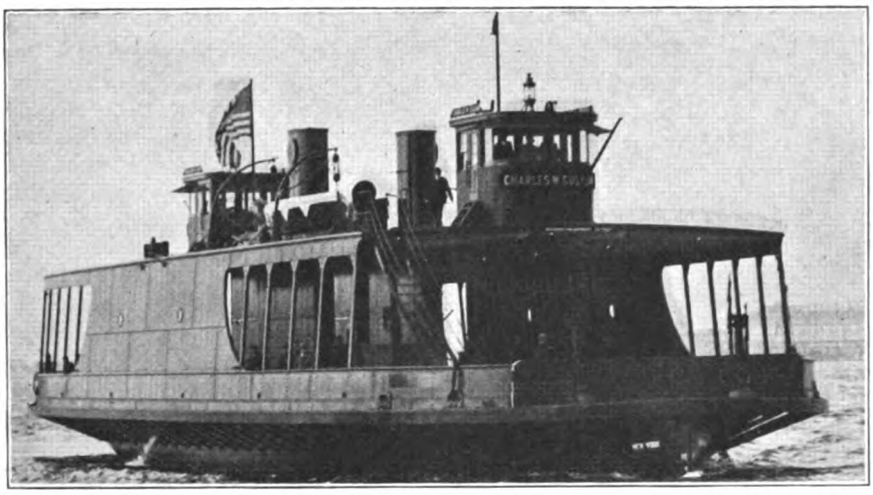
There is one cargo mast with two booms. Forward of the oil tanks there is a cargo hold for package goods. The engine room and pump room are located aft. There is also a steel deck house aft providing accommodations for eight men, galley, messroom, stores and toilets. A wooden pilot house and quarters for the captain and engineers is located on top of the crew's house.

Complete control of the operation of the vessel is provided in the pilot house by means of Westinghouse marine type Ward-Leonard system. There is also complete engine room control. The 350 horsepower double armature propulsion motor turns at 160 revolutions per minute.

Trials of the RICHLUBE demonstrated fully her complete flexibility in maneuvering. It is possible to check her from full speed ahead to the beginning of astern motion in about a minute.



GOVERNOR MOORE and CLASS—Diesel Electric Ferries



DESCRIPTION

Six diesel electric ferries of the type shown are now in operation between the Erie terminals at Weehawken and Undercliff, N. J. and Twenty-third street, New York City. Two diesel engines direct-connected to generators furnishing current to a single direct current double armature motor of 580 horsepower, driving a through shaft with a propeller at each end.

Name—GOVERNOR MOORE and Class
Owner—Electric Ferries Inc.
Builder—Am. Brown Boveri Elec. Corp.
Naval Architect—Eads Johnson
Launched—GOVERNOR MOORE, CHARLES W. CULKIN, Oct. 21, 1926; GRENVILLE KANE, Nov. 16, 1926; W. A. BALDWIN, Dec. 7, 1926; FREDERICK PEIRCE, Dec. 29, 1926; FRANK M. GANNETT, Jan. 29, 1927. The first three were delivered in November, 1926; the last three, in December, 1926, and January and February, 1927 respectively.
Classification—Equal to American Bureau

HULL PARTICULARS

Length overall, 155 feet; length between perpendiculars, 131 feet; breadth over guards, 48 feet 6 inches; breadth molded, 37 feet; depth molded, 14 feet 3 inches; draft, light, 8 feet 6 inches; draft loaded, 9 feet; displacement light about 500 tons; gross tonnage about 405; five lanes of cars can be carried on the main deck or a total of 46 average size automobiles; fuel oil capacity about 3500 gallons; speed, 13 miles per hour.

MACHINERY PARTICULARS

Main Engines—Two Nelseco diesel engines of latest mechanical injection type; six cylinder, 4 cycle single acting developing 350 brake horsepower each at 280 revolutions per minute; bore and stroke, 12¼ x 18 inches; piston displacement, 12,636 cubic inches; built by New London Ship & Engine Co.

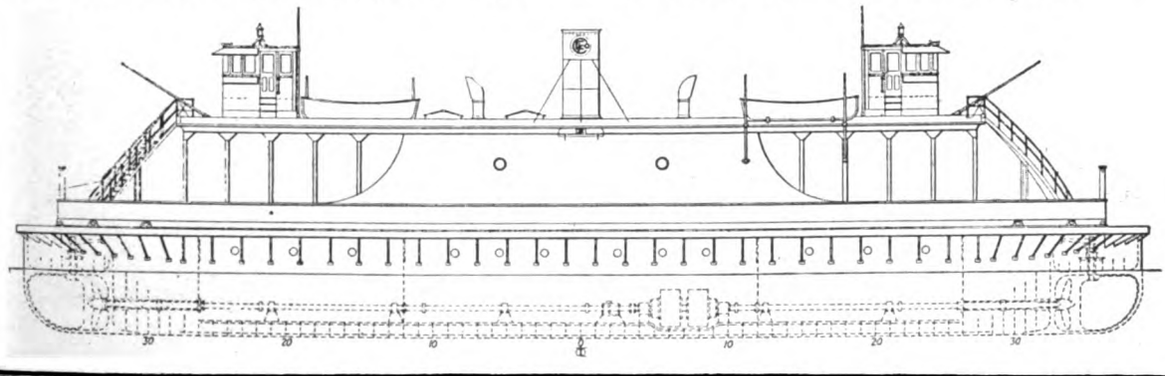
Main Generators—Two, each direct-connected to one of the above diesel engines of 240 kilowatts at 250 volts; built by the American Brown Boveri Electric Corp. in conjunction with the Electro-Dynamic Co.; each generator has an attached exciter of 35 kilowatts.

Main Motor—One, shunt wound, eight pole direct current, double armature motor of 580 horsepower at 250 volts and 180 revolutions per minute driving the through propeller shaft carrying a 3 bladed, 7-foot propeller at each end; same builders as the generators.

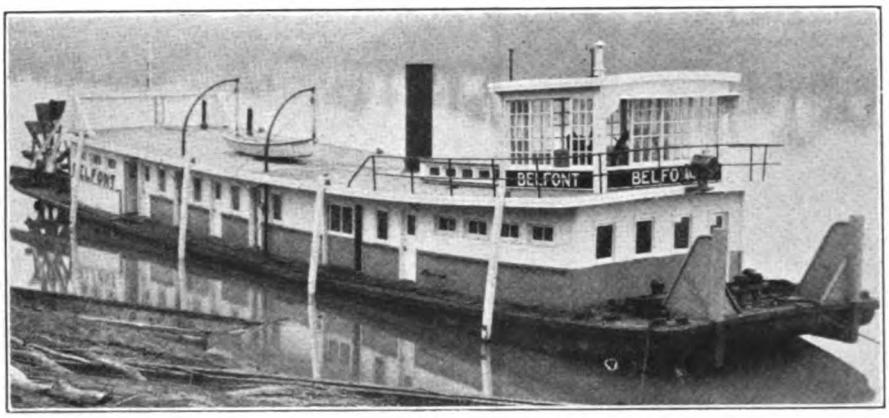
AUXILIARY EQUIPMENT

Generator-Compressor—Hill Diesel
Compressor—Ingersoll-Rand
Steering Gear—American Engineering Co.
Pumps—Gould, Northern
Thrust—Kingsbury type
Pilot House Control—Ward Leonard
Rudder Angle Indicators—Cory
Engine Direction Indicators—Cory

On account of the diesel drive an economical arrangement of space for vehicles is made possible. The only obstruction is two narrow steel trunks for access to the engine room. There is therefore room for five lanes of traffic, accommodating 40 automobiles and 5 large trucks or busses. Passengers are not carried.



BELFONT—River Towboat—Stern Wheel—Diesel



DESCRIPTION

The sternwheel diesel river towboat BELFONT is built of steel and is one of the largest boats of this type driven by means of a center wheel gear. For the shallow draft under which these boats must operate, the paddle wheel gives good results.

Name—BELFONT
Owner—Indiana-Belfont Transp. Co.
Builder—Marietta Mfg. Co.
Naval Architect—Marietta Mfg. Co.
Completed—May, 1926
Classification—Western Rivers Towboat

HULL PARTICULARS

Length overall, 120 feet; length between perpendiculars, 100 feet; breadth molded, 24 feet; depth molded, 4 feet 4 inches; draft, 3 feet 4 inches; gross tonnage, 160.

MACHINERY PARTICULARS

Main Engine—One, full diesel, 6-cylinder, 14-inch diameter x 17-inch stroke, 2-cycle, solid injection, Fairbanks Morse engine of 360 brake horsepower; direct connected to longitudinal shafting transmitting power to the stern wheel.

AUXILIARY EQUIPMENT

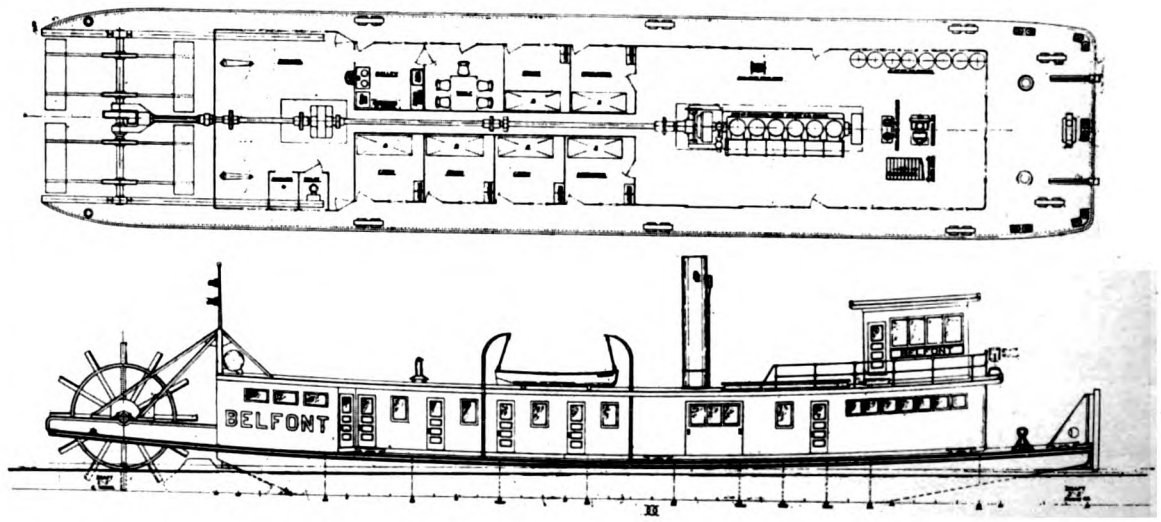
Manufacturers of:
Pumps—Fairbanks Morse & Co.
Electric Generators—Fairbanks Morse & Co.
Telegraphs—Chas. Cory & Son Inc.
Valves—Lunkenheimer Co.
Capstans—American Engineering Co.

The BELFONT is one of the largest stern wheel diesel engine driven towboats using a center wheel gear drive, on the inland waters in this country. Power is transmitted from the main engine through an extension of the crankshaft to a spur reduction unit near the after end of the hull and from this reduction unit through more shafting and flexible couplings to a bevel gear reduction mounted on the center of the stern paddle wheel shaft.

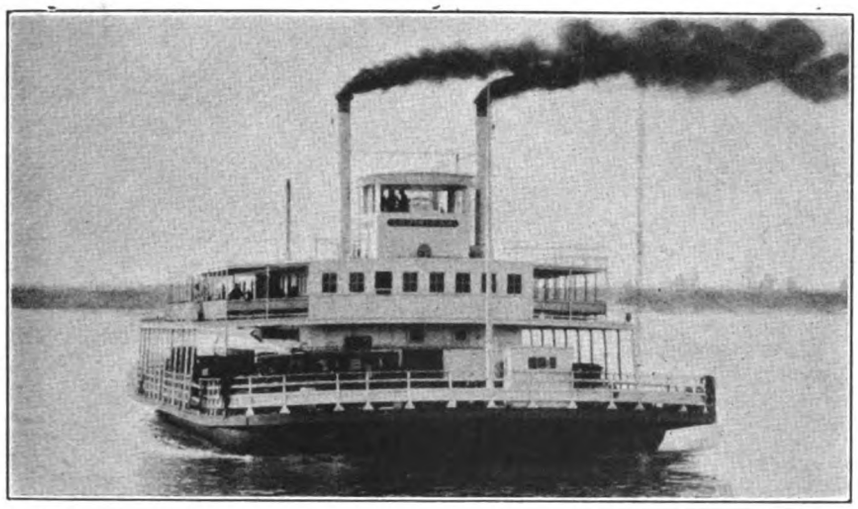
The paddle wheel is split in the center and the buckets are staggered. The BELFONT, completed in May last year is engaged in service for the Indiana-Belfont Transportation Co. towing barges loaded with pig iron, steel wire and nails from Ironton, O., to Cincinnati, Louisville, Evansville and Memphis.

Return cargoes of hardwood lumber are carried from Memphis to Coal Grove, O., near Ironton. Reports show that the BELFONT is economical in fuel consumption and consequently her operating costs are exceptionally low. In the time, in which this vessel has been in operation which is now a matter of nearly a year, she has proved highly satisfactory in this service.

The particularly unique and interesting feature in connection with this towboat is in keeping the stern wheel and in going to the diesel engines for power.



LOUISIANA—Catamaran Ferry—Paddle Wheel—Steam



DESCRIPTION

This catamaran, steam, paddle wheel, river ferryboat is constructed of steel throughout with the exception of the main deck covering, the boiler deckhouse and the upper deck which are of wood. The hulls are divided into eight watertight compartments, each compartment being provided with steam syphons. There is a steel house on the main deck.

Name—LOUISIANA
Owner—Baton Rouge Transp. Co.
Builder—Howard Shipyards & Dock Co.
Naval Architects—Cox & Stevens
Launched—July 21, 1926
Completed—Oct. 21, 1926
Classification—Auto & Pass. Ferry, Rivers

HULL PARTICULARS

Length overall, 150 feet; length between perpendiculars, 146 feet; breadth molded, 64 feet; depth molded, 9 feet 3½ inches; draft, 4 feet 6 inches; gross tonnage, 438; net tonnage, 438; passenger capacity, 400; cargo capacity, 35 automobiles; speed, 10 statute miles per hour.

MACHINERY PARTICULARS

Main Engine—Two, straight high pressure steam, horizontal; size, 17 inches by 7 feet; builder, Gillett & Eaton; noncondensing type; fitted with steam reversing gear.

Boilers—Two, of horizontal fire tube type; size, 42 inches by 22 feet in length; ten, 6-inch flues; builder, Fowler-Wolfe, Paducah, Ky.; fuel, coal only.

AUXILIARY EQUIPMENT

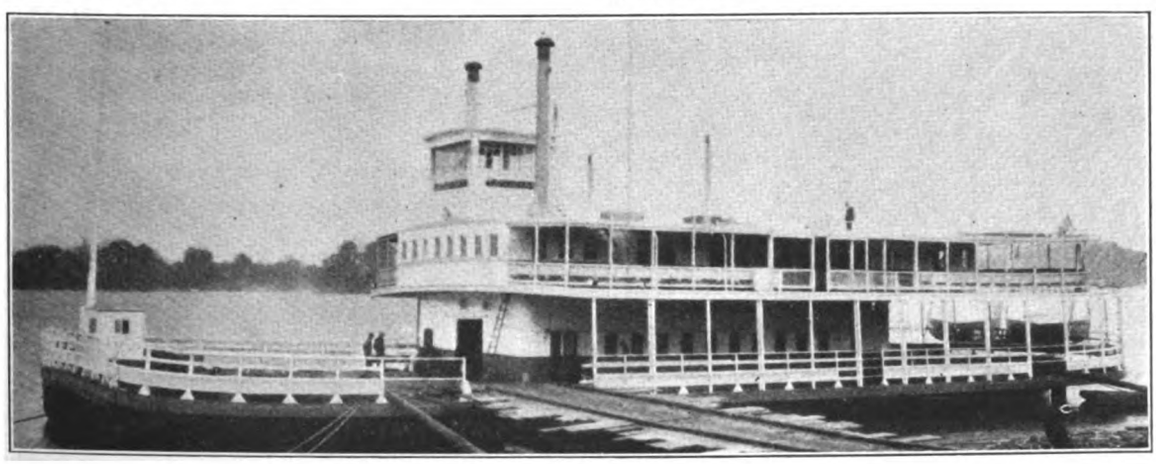
Manufacturers of:

Pumps—Gillett & Eaton
Steering Engine—Gardner Foundry Co.
Electric Generators—General Electric Co.
Turbine—For 10 k. w. generator, Terry
Pumps—Hagewald; Vogt Bros. Mfg. Co.
Hand Pump—Two, Douglas
Injector—One, two-inch, Metropolitan
Fire Pump—Worthington Pump & Mach. Corp

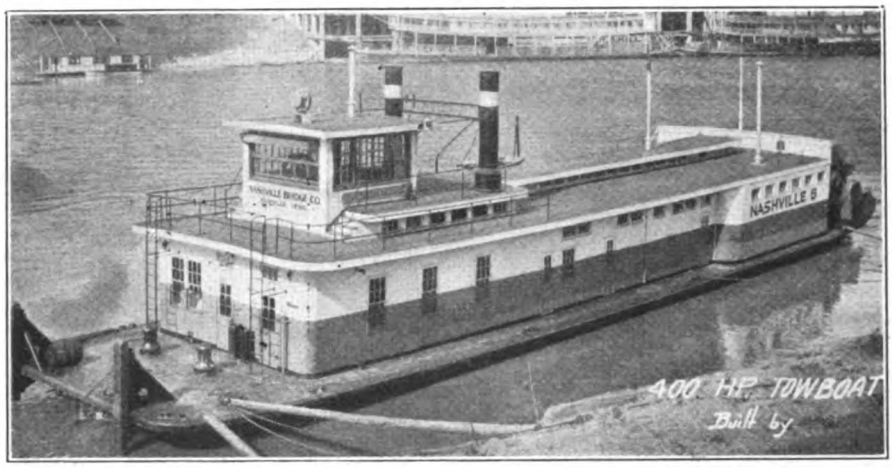
The catamaran ferryboat shown here is said to be the finest and most modern of this type operating on the Mississippi river. She was delivered to the Baton Rouge Transportation Co., Baton Rouge, La., for ferry service between Baton Rouge and Port Allen, late in October last year.

This vessel has now been in service about five months and has been thoroughly tried out, has a lower fuel consumption than anticipated and has proven satisfactory in all respects.

The LOUISIANA was designed and built under the supervision of Cox & Stevens, naval architects and marine engineers, New York city, who have been retained as designers of the Warrior line barge boats for the United States government.



NASHVILLE B.—River Towboat—Stern Wheel—Diesel



DESCRIPTION

A steel shallow draft stern wheel diesel propelled river towboat of latest design. Reliability and the ability to back and flank a heavy tow are the chief characteristics of this boat. Two wheels each 15 feet 4 inches in diameter with 13 buckets 30 inches deep and 9 feet 3 inches long operate at 23 revolutions per minute.

Name—NASHVILLE B
Owner—Nashville Bridge Co.
Builder—Nashville Bridge Co.
Designed by—H. B. Dyer
Completed—July, 1926
Classification—Towboat, Western Rivers

HULL PARTICULARS

Length overall, 131 feet; length between perpendiculars, 110 feet; breadth molded, 28 feet; depth molded, 5 feet 3 inches; draft, 4 feet; sheer forward, 18 inches; net tonnage, 111; bunker oil capacity gives an operating period of one month without refueling.

MACHINERY PARTICULARS

Main Engines—Two Worthington, direct reversible, two-cycle solid injection marine diesel engines, each of 200 brake horsepower; each engine is direct-connected to a drive shaft with cutout couplings to facilitate, idling for adjustment purposes. The drive shafts are connected with the jack shafts that drive the stern wheels by link chains.

Auxiliary Engine—One 3-cylinder 18-horsepower Hill diesel engine direct-connected on the same bed plate to a 12-kilowatt 120-volt direct current generator furnishes current for lights, electric capstans, motor-driven fire and bilge pump and other appliances.

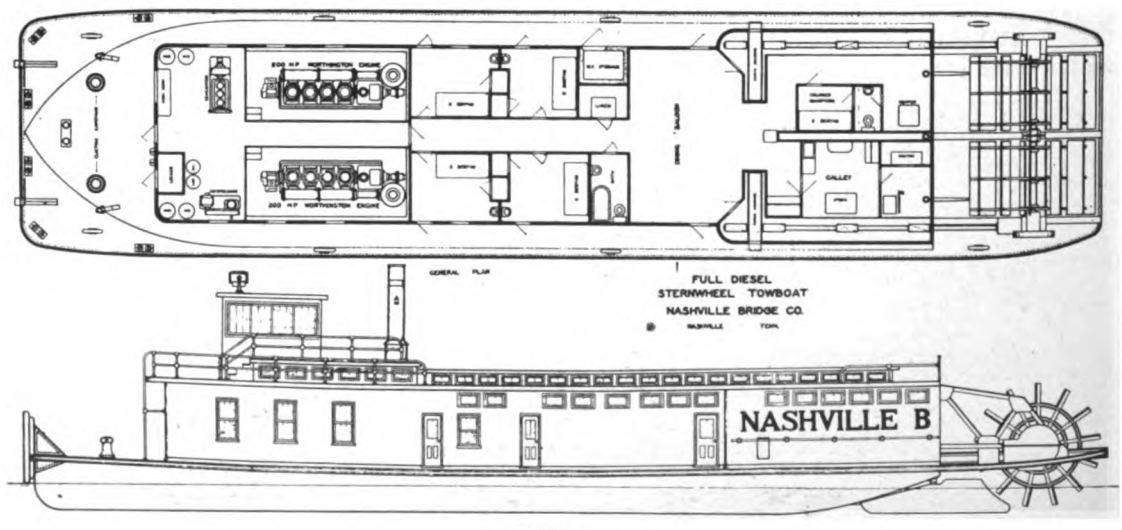
AUXILIARY EQUIPMENT

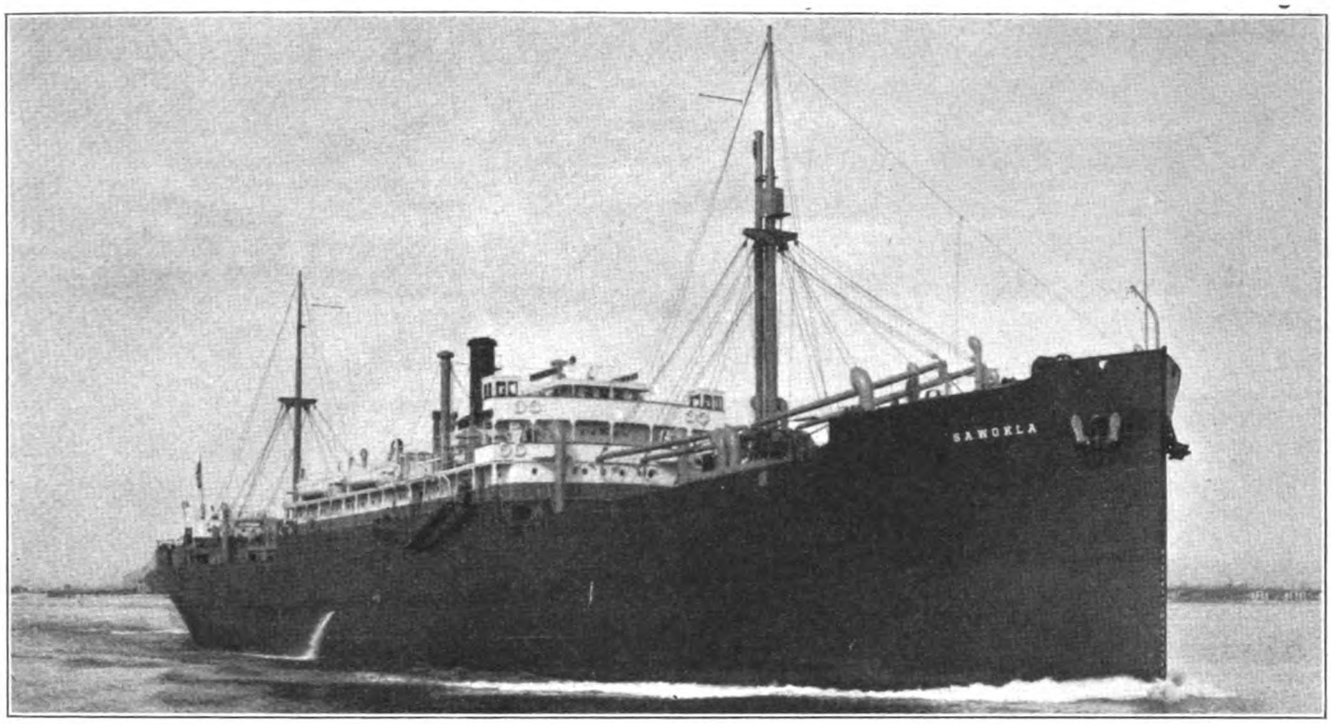
Manufacturers of:

Fire & Bilge Pump—One centrifugal, Worthington
Compressor—One two-stage Worthington
Capstans—Two, Laclede Iron Works
Searchlight—One, 14-inch, Carlisle & Finch
Electric Generator—Engberg

This vessel has a complete steel hull with a well-modeled bow to prevent drift from going under the boat and lodging in the rudders. The easy rake and 20 feet of run at the stern with transom well above the water together with well rounded bilges and flared sides gives her exceptional backing and maneuvering power.

Each one of the two diesel engines are direct-connected to a separate stern wheel so that should it be necessary to stop one engine the other can continue to operate and to keep the boat underway.





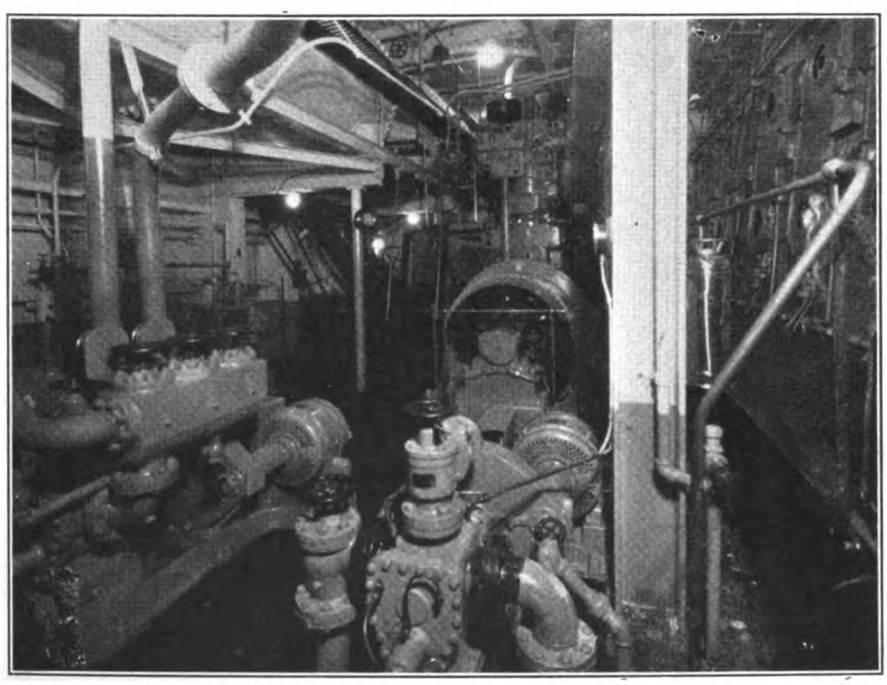
M. S. SAWOKLA—Busch-Sulzer Diesel—Converted at Newport News—Trials, Hampton Roads, March 12, 1926

M. S. Sawokla Makes Favorable Impression on Sea Trials

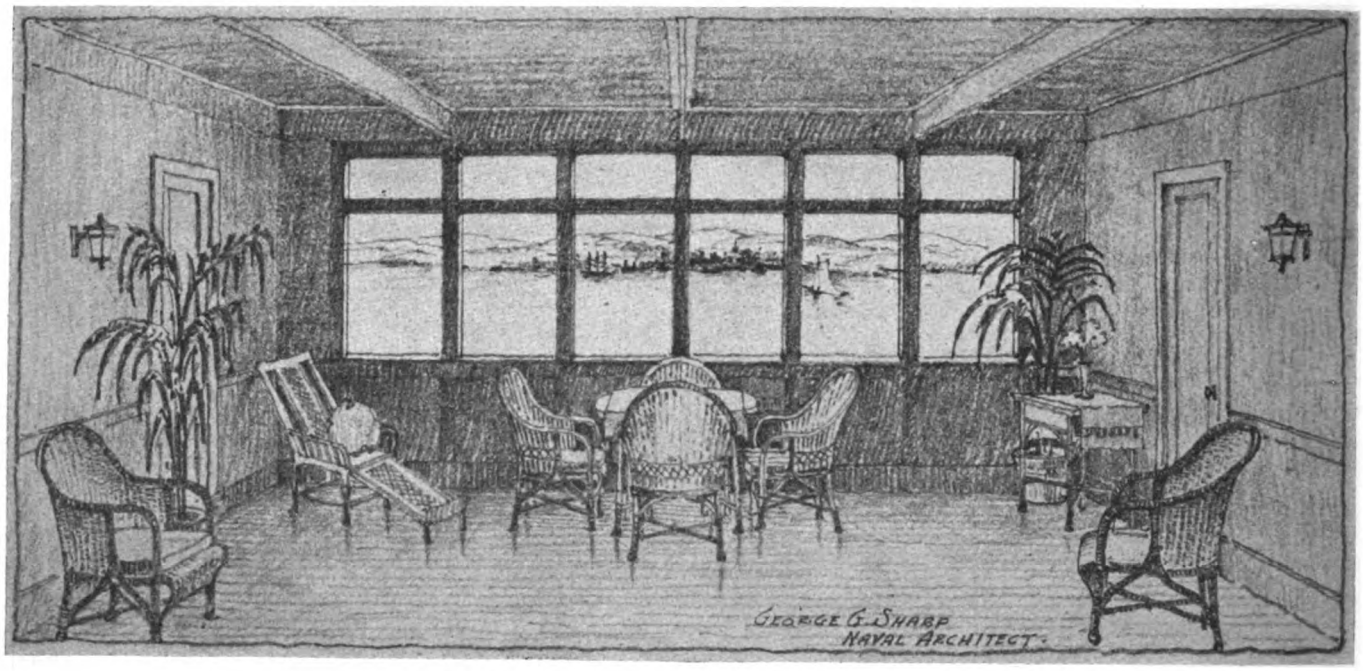
GRADUALLY, and under the circumstances as rapidly as can be reasonably expected, the shipping board program of dieselizing 12 laid up freighters is moving on to completion. The sixth vessel to be converted, the M. S. SAWOKLA, and the first with a Busch-Sulzer diesel engine, was accepted from the Newport News Shipbuilding & Dry Dock Co. after successful all day sea trials off Hampton Roads, Va., on March 12. Other converted vessels accepted after trials and now in service are: M. S. TAMPA, M. S. UNICOI, M. S. WEST HONAKER and M. S. WEST CUSSETA. A sixth the CROWN CITY also successfully completed her sea trials in March and is now in service. An account of the trials of the M. S. TAMPA and M. S. WEST HONAKER appeared in MARINE REVIEW for December 1926 and January 1927 respectively.

The day of the trial of the M. S. SAWOKLA began mild and clear and the vessel left the yard of the Newport News Shipbuilding & Dry Dock Co. at 7:30 a. m. for Old Point. The draft taken just before leaving the yard was 8 feet 6 inches forward and 13 feet 10 inches aft. While waiting to take on guests and observers for the trial trip an anchor test was made. The sea trials began at 9:30 a. m. working up to full power at once. A distance of about 100 nautical miles was logged on a course out to sea and return to Old Point. Besides the straight run of six hours various maneuvering tests were carried out including figure eights to test the steering gear, full speed astern, time to check headway, and number of starts possible with one starting tank. From the shipping board observers' data the average revolu-

(*Con. on Page* 84)



STARBOARD SIDE ENGINE ROOM OF THE M. S. SAWOKLA—BUSCH-SULZER MAIN ENGINE IS SHOWN AT RIGHT—AUXILIARIES IN CENTER

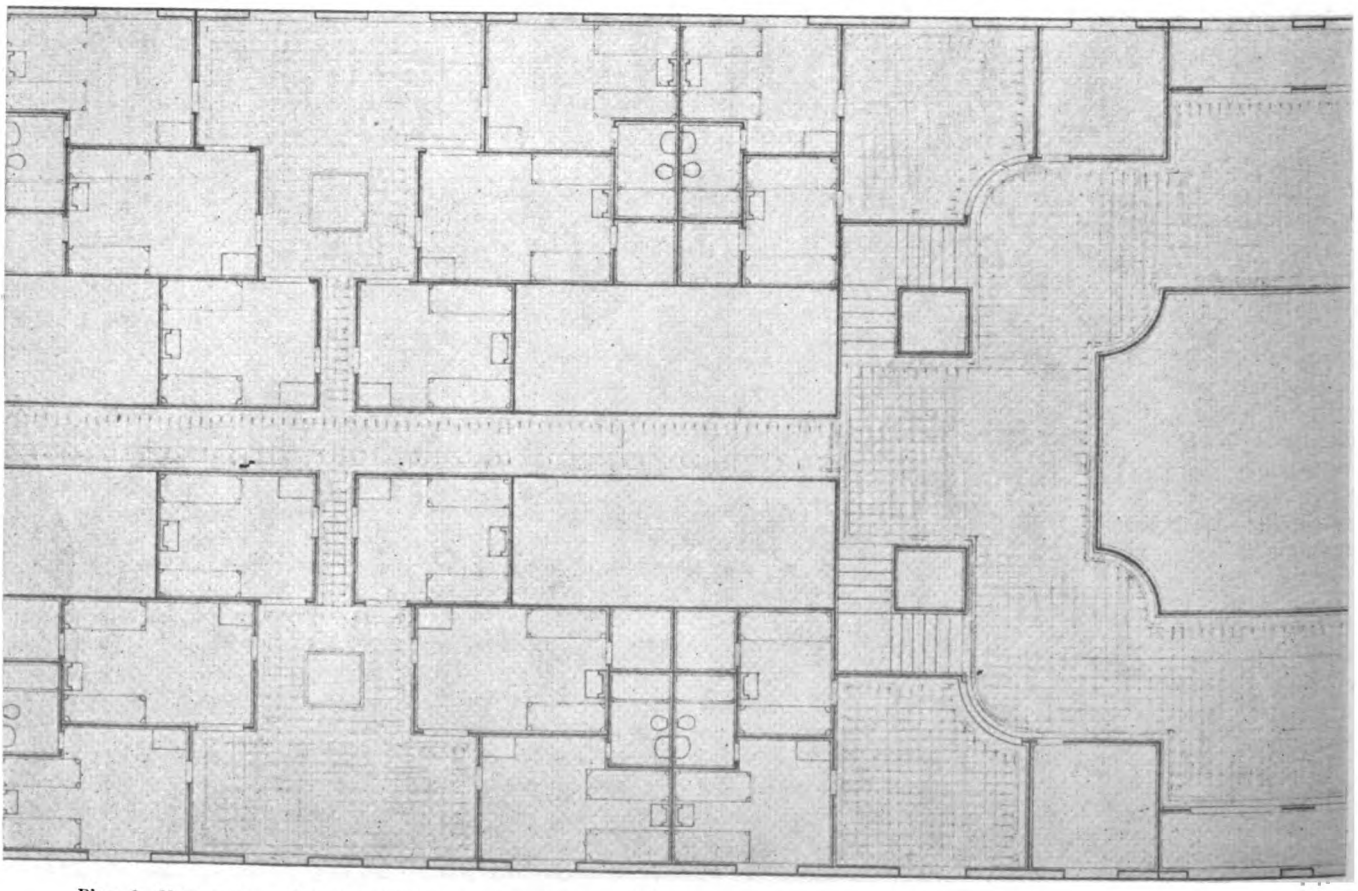


Photograph A—Suggested enclosed veranda, with staterooms opening off on either side

Passenger Quarters Are Improved

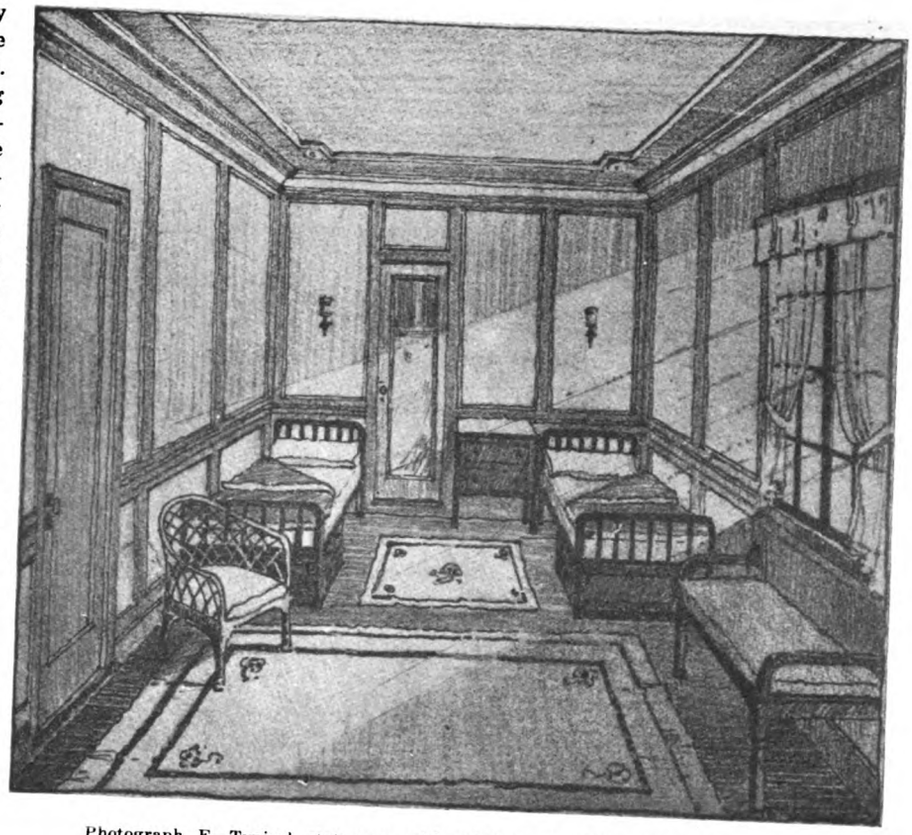
New System Planned to Give More Outside Rooms — Increase Attractiveness by Grouping to Give Access to Verandas

IN THE design of passenger steamers naval architects and shipbuilders have applied a great deal of thought in order to obtain economies in operation. Much good work has been accomplished by tank research and other means to improve the economics of propulsion. Also much has been accomplished in the matter of providing more luxurious accommodations for the traveling public whose demands are ever in-



Plan 2—New system of accommodations with staterooms bulkheads arranged on the stepped principle—giving larger rooms

creasing. This is noticeable not only in recent new ships, but also in the newer hotels and in railroad travel. While modern vessels are being equipped in a more luxurious manner to meet the demands of the traveller, these demands have hardly been anticipated to the same extent as in the case of modern hotels and other land accommodations. This may have been caused by difficulties attedant upon obtaining a large number of rooms with direct connection to outside light and air, and providing private bathrooms, all of which the public have become accustomed to.



Photograph E—Typical stateroom with window at right, opening on veranda

Lighter and Better Ventilated Rooms

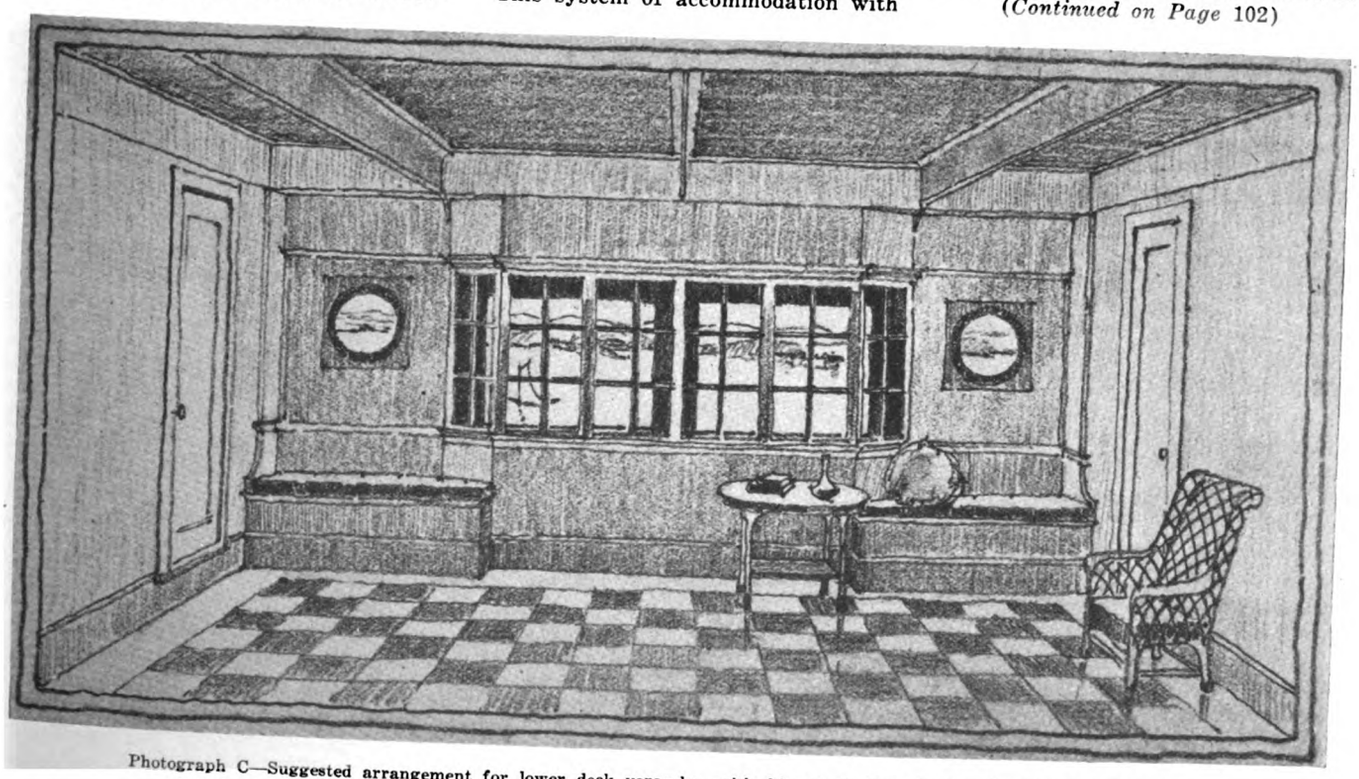
The increasing beam of vessels makes the problem more acute due to the greater number of inside rooms. The "shut in" feeling of travel in an inside stateroom is an admitted objection and to many people so offensive that trips are postponed rather than to suffer the discomfort of inside accommodation. For travel in the tropics or warm climates, the inside room is most undesirable.

It would seem to be natural that naval architects and marine engineers should direct great efforts toward economics in operation, yet it is most important that the best possible effort be made to study the primary object for which the passenger ship is constructed, the comfort and pleasure of the passengers in transit. A careful study so made will be reflected by consequent increase in revenue to be derived by the steamship owner.

The new system of passenger accommodation described here is intended to give more attractive, lighter and better ventilated rooms. It may be readily understood by reference to the accompanying plans and illustrations.

This system of accommodation with stateroom bulkheads on the "saw-tooth" principle is applicable in cases where small staterooms for overnight journeys are suitable for the trade, resulting in a larger number of staterooms relative to the beam of the vessel. It is also applicable as shown in plan No. 1 in the case of ocean going vessels of great beam where it

(*Continued on Page* 102)



Photograph C—Suggested arrangement for lower deck verandas with hinged shell ports or airports as preferred

Personal Sketches of Marine Men

T. V. O'Connor, Chairman, United States Shipping Board

By L. M. Lamm

HIS sympathies are broad. He is a keen student of human nature and knows thoroughly the psychology of both employe and employer.

DIRECT and definite in his views, with strong convictions, he nevertheless can bring discordant elements into harmony for the common welfare.

INITIATIVE and action has marked his conduct of shipping board affairs with the single purpose of building up a merchant marine.

IT SEEMS clear that if our merchant marine is to be completely transferred and adequately maintained in the hands of private American capital in the immediate future instead of ultimately, then some form of government aid is necessary to enable the American owner to overcome the advantages gained by the foreign owner through his long training and entrenchment during the many years that America was off the oceans." That in a nutshell is the opinion of T. V. O'Connor, who has been chairman of the United States shipping board since February, 1924. In addition, he believes, that there is a somewhat higher capital charge burdening the American owner due to higher construction costs in this country. Comparatively little seems to be knwon about the man of these ideas who has been the Great Lakes representative on the shipping board since 1921 and its chairman for the past three years.

He was born in 1870 in Toronto, Canada, moving two years later to Buffalo with his parents where he attended the public schools. At an early age he was a fireman on a harbor tug in the port of Buffalo, later obtaining a license as marine engineer in which capacity he served until he obtained a license as master.

He filled this latter position until 1906 when he was elected president of the Licensed Tugmen's Protective association of the Great Lakes, which position he held for a couple of years when he became president of the International Longshormen's association, remaining head of this latter association until June, 1921 when he was appointed a member of the shipping board by President Harding.

During the many years Mr. O'Connor was connected with the International Longshormen's association he had an opportunity of becoming very familiar with all the phases of work incident to physical operation of vessels which experience has been invaluable to him as a member of the shipping board.

In 1921, Mr. O'Connor was chosen by Nathan L. Miller, governor of New York as one of the members of the state industrial board which position he only held for a few months when he was appointed vice chairman of the shpping board. He was originally appointed chairman of the board in 1924 and in June, 1926 he was reappointed commissioner and chairman for another six-year period. The bureau of operations of the board has remained under him since he was originally appointed.

Mr. O'Connor has resided in Buffalo practically all of his life and he still holds licenses as marine engineer and master. During the World war he served as a member of the national adjustment commission, which was a board established for the fixing of wages and conditions in the longshore industry.

As chairman of the board one of Mr. O'Connor's achievements was the sale of 199 ships to Henry Ford for scrapping purposes. This sale was brought about at a time when there was extreme criticism on account of the great amount of surplus tonnage which was in no way likely to be used.

Those in Washington in a position to know state that Mr. Ford became interested in bidding through representation of the chairman that the steel in the vessels might be salvaged and used for automobiles. Mr. O'Connor presented a proposal to the board that about 200 vessels be scrapped and, accordingly, advertisements were issued for competitive bidding for the ships.

The Ford bid was the most desirable from all, points of view and, as a result, material which otherwise might have deteriorated beyond repair was put to good use.

Discussing the merchant marine situation with the writer Mr. O'Connor called attention to the fact that before the World war we transported in American flag vessels about 10 per cent of our foreign commerce; today we are carrying some 30 per cent, while the volume of our foreign commerce has increased about one hundred per cent since the beginning of the war.

"We are working toward a merchant marine sufficient in size to carry at least fifty per cent of our commerce, and we are advised that this would balance with our naval and military requirements," he continued.

"We have sold more than a thousand ships to private capital and we have transferred several established ship lines for guaranteed operation under the American flag.

"In other words, not only have we had a well defined merchant marine policy, but today we actually have a merchant marine. It is true the bulk of our ships in foreign trade are of necessity owned and operated by the government as directed by law, and it may be that government operation will continue for several times that many years before it can be transferred to private operation permanently. And yet such a period is a short time in the life of a nation, and the nation's interest is always paramount."

During his early work in the union's Mr. O'Connor found that decent approach was the main thing from the employe to the employer and he worked most successfully along those lines. Following this idea and beginning at Buffalo his name spread from one end of the Great Lakes to the other in the labor movement until he became one of the best organizers of the time.

Stern Wheel Diesel Towboat Launched

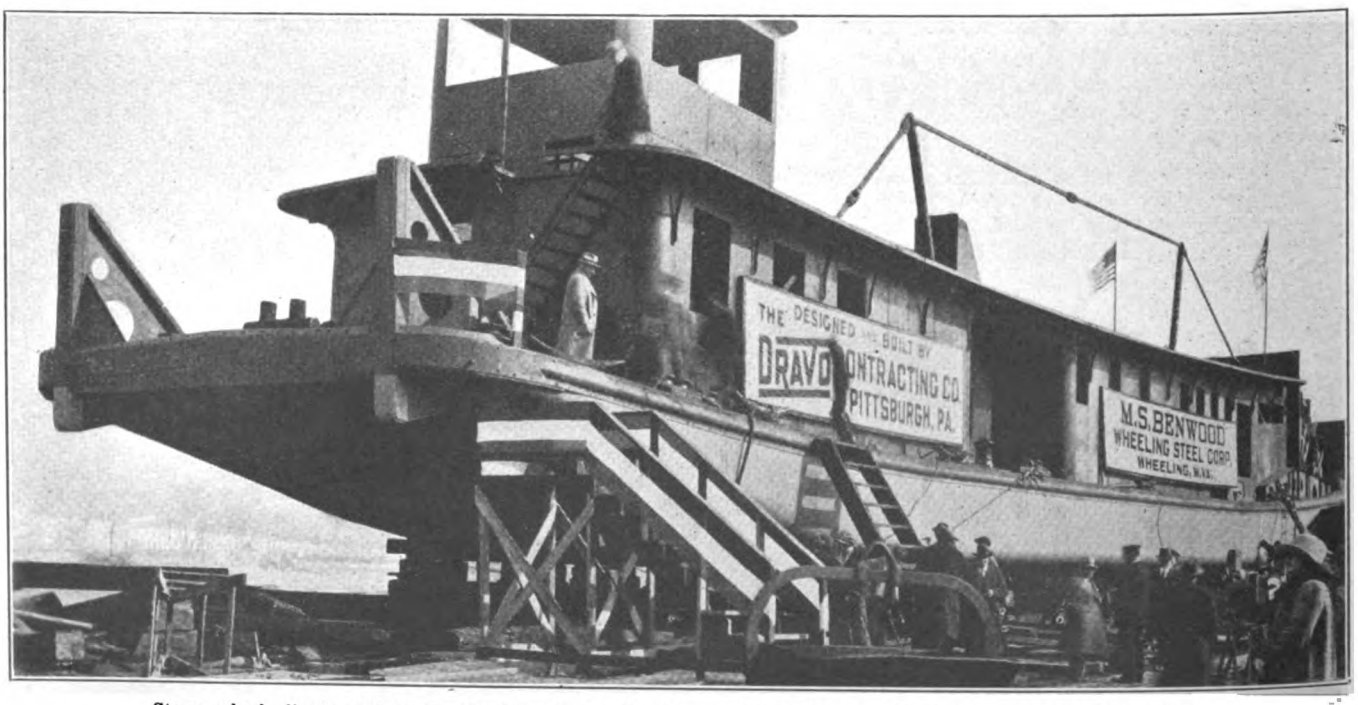
BY W. H. LLOYD

AUGMENTING the already large fleet of all-steel towboats in operation on the Ohio river, the diesel towboat BENWOOD was launched Feb. 17, from the ways of the Dravo Contracting Co., Neville Island, near Pittsburgh, for the La-Belle Transportation Co., the river shipping subsidiary of the Wheeling Steel Corp., Wheeling, W. Va. This is another step taken by this interest toward the perfecting of its facilities for transportation of iron and steel by water, so that it may fully take advantage of the complete canalization of the Ohio river, scheduled to be realized by 1929 or at the latest 1930. With an over-all length of 150 feet, a beam of 27 feet and a depth of 5½ feet, this stern wheel boat will operate on a draft of 3¾ feet; and developing 480 horsepower, will be one of the most powerful towboats of its type now engaged in this constantly expanding traffic.

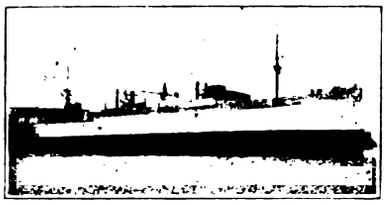
Propelling equipment consists of two Fairbanks-Morse diesel engines, each 240 horsepower, operating independently to drive a split stern wheel. Additional deck equipment consists of two forward capstans and two side capstans, with generating units to furnish their power. These generating units will likewise furnish power for an electric refrigerator and a powerful searchlight. The boat is equipped with complete crew's quarters and all conveniences. A full toned whistle is operated by means of compressed air.

Miss Mary Cavanaugh, daughter of Capt. Thomas Cavanaugh, master of the transportation fleet of the Wheeling corporation, was the sponsor, breaking a beribboned bottle of champagne on the prow of the ship a second or two before it was released from the retaining lines and the blocks were knocked away. The launching, witnessed by officers of the Wheeling Steel Corp., the Dravo Contracting Co., and numerous rivermen, was in charge of V. B. Edwards, general manager of the Dravo company, and afterwards the visitors were the guests of R. M. Dravo, vice president of the company, at a luncheon in the dining room.

New boats to take care of growing traffic are needed.



Stern wheel diesel towboat Benwood built by the Dravo Contracting Co. for operation on the Ohio river



M. V. Kolsnaren. Transatlantic S.S. Co.

This motor vessel has been using Texaco URSA oil for the lubrication of its Diesel engine cylinders, auxiliaries and air compressors, ever since May 17th, 1923.

TEXACO URSA OIL for Diesel Engines

Burns Cleanly!

It cannot form troublesome deposits of hard carbon.

It is true, of course, that there is no oil—whether for Diesel Engines or any other prime mover—that will not deposit some carbon. *But*—and this is important—there is a marked difference in the *nature* and *quantity* of carbon deposited by different makes of Diesel Engine lubricants. A trial of Texaco URSA Oil for example, will convince you that it leaves a surprisingly small amount of carbon. And the little there is, is of a soft fluffy nature.

This is due largely to the entire absence of paraffin or cylinder stock, and to the scrupulous care in our process of refining which removes all tarry or gummy residues that might form hard, wear producing carbon. But that is only one of the reasons why Texaco URSA Oil is so especially suited for the lubrication of Diesel engines.

Here are others equally important—

1—It lubricates thoroughly.

2—It does not form gummy deposits.

3—It goes through the separators easily and is readily cleaned and reclaimed.

4—As it has an exceedingly lower pour test, it can be relied upon not to clog piping at low temperatures.

5—It is of proper viscosity to meet bearing pressures.

6—It maintains effective cylinder compression, thus assuring easy starting and the delivery of full power—and finally:

7—It can be depended upon for uniformity. Because no matter what port you buy it at—Texaco URSA Oil is uniformly the same pure, clean, correct-bodied, dependable oil for Diesel engine lubrication.

We invite your inquiry and extend the cooperation of our Engineering Department.

STOCKS KEPT AT PORTS THROUGHOUT THE WORLD.

THE TEXAS COMPANY

Texaco Petroleum Products

Dept. V4, 17 Battery Place, New York City

Offices in Principal Cities

Shipbuilding Increased

(*Continued from Page* 13)

in one source of so many of the newest vessels gives a striking pictorial and descriptive review of the range of American shipbuilding. As an indication of the wide field of our domestic commerce, among the distinctive ships will be found the new Panama-Pacific liner which will cost over $6,000,000 and a modern oil engine driven western rivers towboat costing $120,000. The detailed information given is authoritative as it has been obtained directly from the builder, the owner or the naval architect.

An analysis has been made of the types of power in all of the 121 vessels listed as under construction in 1926, and a comparison has been made with a similar analysis for 1925 as shown in the accompanying box on page 12. It is interesting to note that though the number of reciprocating engined coal burning vessels has increased slightly the percentage has dropped; and taking all steam reciprocating engined vessels, coal and oil burners there is a drop of six in number and 11.1 in per cent. This classification for 1926 still represents 41.3 per cent of all vessels listed, which is the first time since these records were started that it has dropped below 50 per cent, being 57.4 for 1924 and 52.4 for 1925.

Types of Power Changing

Diesel engine direct and diesel electric drives show a decided increase. A study of this table shows the tendency in motive power by actual installations in the vessels listed as under construction in the respective years compared. It is not safe to generalize too freely from these definite figures. A change in owner requirements leading to the ordering of types of vessels not under construction in these periods would have some effect on the number of vessels with one kind or another motive power. However, there is an apparent trend to diesel and diesel electric, particularly in smaller vessels.

The table on page 13 similar to the table used in the distinctive ship number of MARINE REVIEW a year ago so that a direct comparison can be made, shows the type, service, motive power and fuel of all of the 121 steel powered merchant vessels listed on pages 56, 57. Classification of type are noted in the first column. The number of vessels of each type is arranged in the next column, the total of these adding up, of course, to 121. The number of each type is in turn split up under the headings for motive power. For purposes of clearness the definition of the abbreviations at the head of each column from left to right are repeated as follows: steam reciprocating engines with coal burning boilers; the same with oil burning boilers; steam turbines and reduction gears with oil burning boilers; diesel engines direct-connected; diesel electric; turbine-electric with boilers burning oil; turbine-electric with boilers burning coal.

Sailing-Hour

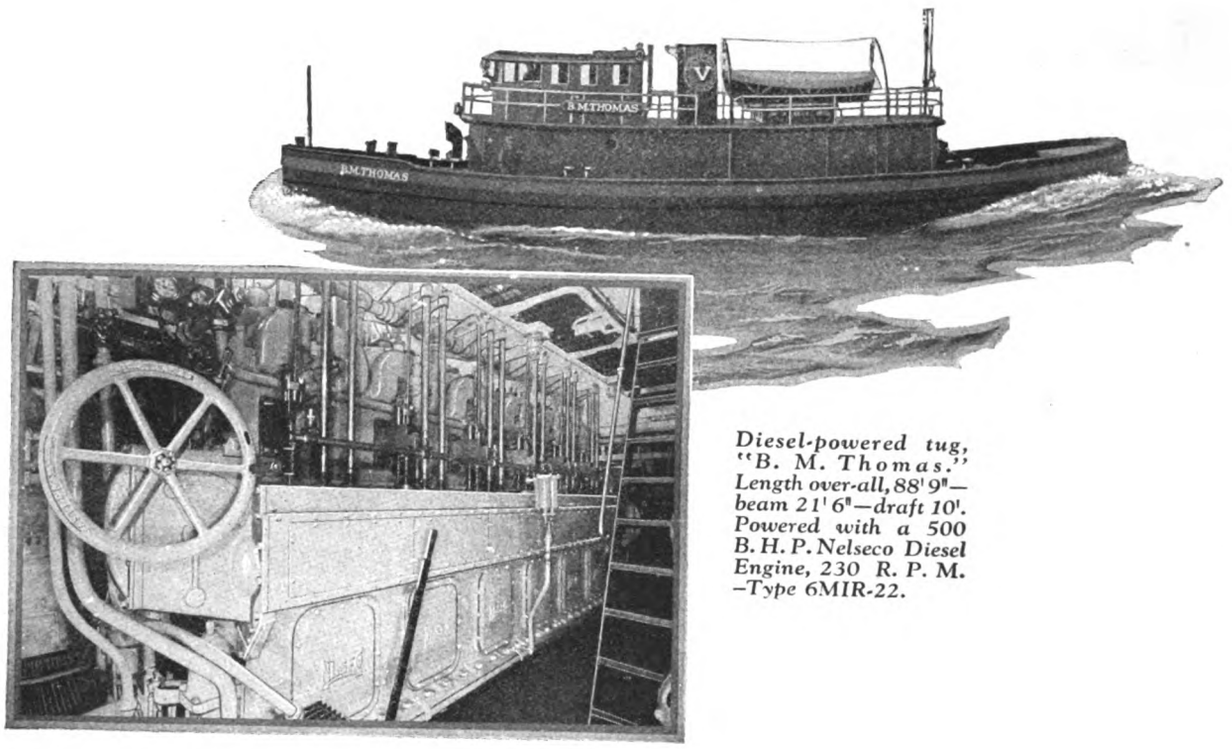
Bound South with Coal

BENEATH our feet the loaded ship stirs like a soul awaking.
As half-unmoored she sways and moans, conscious her trance is breaking.
The great cranes sigh and lift their load, pouring the coal below
The last truck tilts, the tugboat waits, the calling waters flow
Outward—Southward.

THE head-light, port and starboard lights, rise to their stations high,
The vessel speaks her farewell—"let go! All clear! Stan' by!"
The winches roar, the anchor lifts; we wait the touch of life
Await the clean and moving wind, await the savage strife.

THE engine throbs, the screw responds, our hearts grow light again,
For now we draw away from land's confusion, trouble, pain.
The Master looks ahead: the ship, conscious, receives her soul—
"Full speed!" She goes with God again, star-guided to her goal—
Outward—Southward.

Mrs. L. A. Ferguson
Inellan, Scotland



Diesel-powered tug, "B. M. Thomas." Length over-all, 88' 9"—beam 21' 6"—draft 10'. Powered with a 500 B. H. P. Nelseco Diesel Engine, 230 R. P. M. —Type 6MIR-22.

In continuous 24-hour service on the Schuylkill River

NO shut downs—no repairs—only slight delays for refueling. That is the record of the tug, "B. M. Thomas," which has been engaged in continuous towing service at Philadelphia for several months.

This vessel, owned by the Haines-port Mining & Transportation Company—a subsidiary of the Van Sciver Corporation, was completely built last year at the Groton Plant of the New London Ship & Engine Company. It is powered with 500 B. H. P. Nelseco Diesel engine—direct reversible, mechanical injection—Type 6MIR-22.

Being manned with double crews and equipped with fuel tanks of 9,000 gallons capacity this tug is able to maintain almost continuous 24-hour towing service.

Nelseco engineers will be glad to tell you about other interesting Nelseco Diesel installations. In writing ask for pamphlet M. R.

NEW LONDON SHIP & ENGINE COMPANY
Groton, Conn., U. S. A.

Chicago Representative
H. JACOBSEN
25 North Dearborn Street

New York Sales Office
247 Park Avenue, New York City

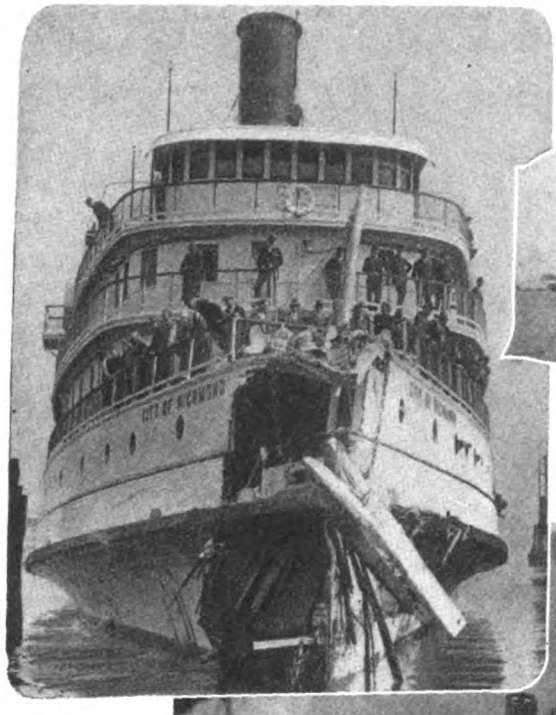
West Coast Representative
KING-KNIGHT CO.
Seattle, San Francisco, Los Angeles

NELSECO

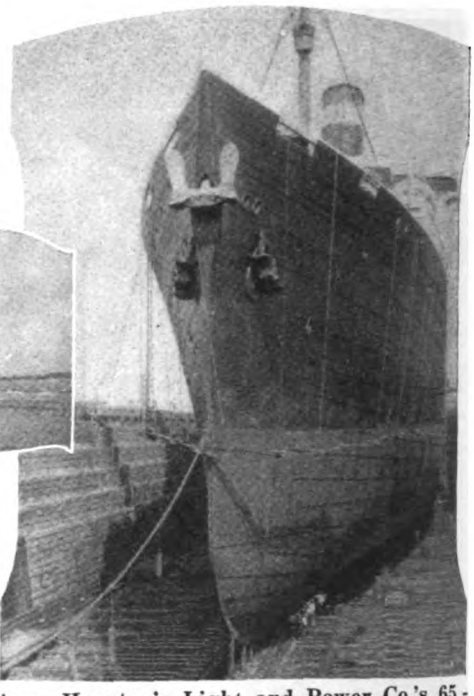
Original licensees from and collaborators with M. A. N. since 1910

Latest Marine Events in Pictures

Chesapeake bay steamer City of Richmond after sinking her sister boat, City of Annapolis, near the Potomac early Feb. 24. One passenger in the path of the prow was killed. The remaining 100 safely transferred to the City of Richmond

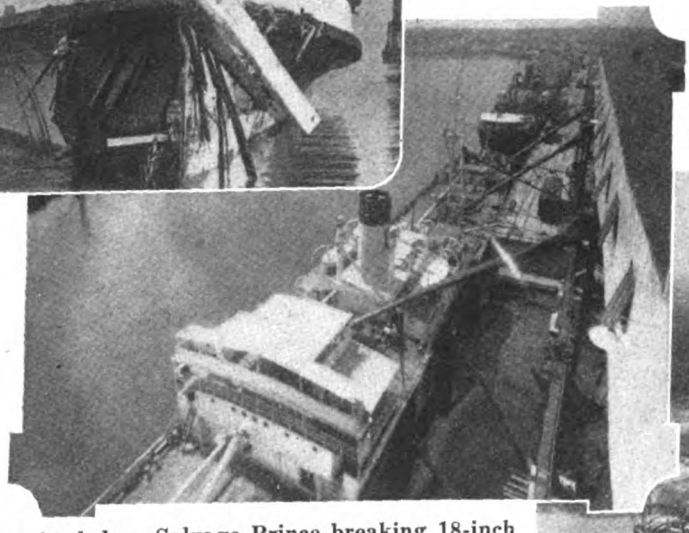


United States liner Leviathan in the Commonwealth drydock, Boston

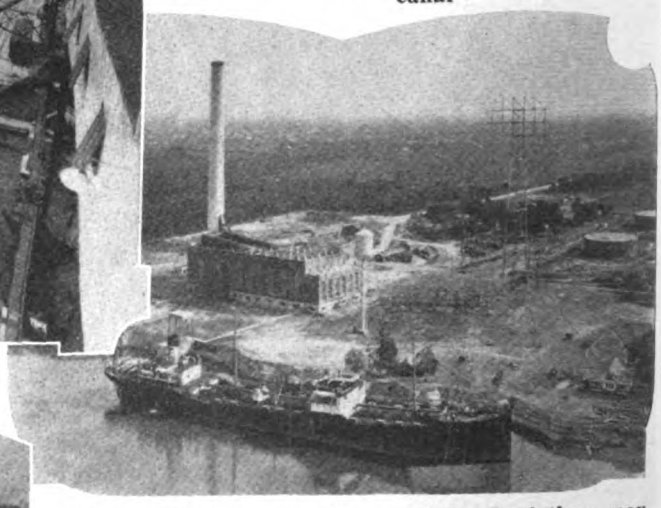


Bulk lake freighter Merton E. Farr

Below—Bird's eye view of part of Houston harbor and turning basin

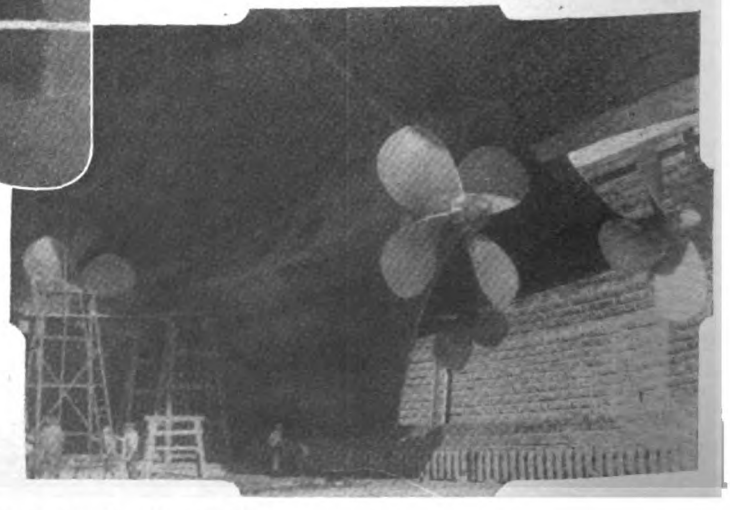


Below—Houston's Light and Power Co.'s 65,000-kilowatt electric plant on Houston ship canal

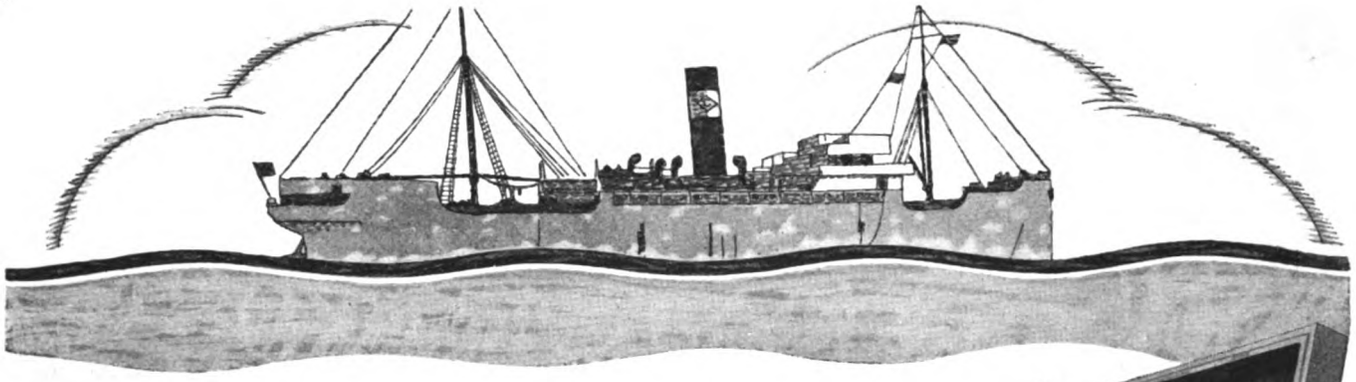


At right, below, Salvage Prince breaking 18-inch ice on the Great Lakes

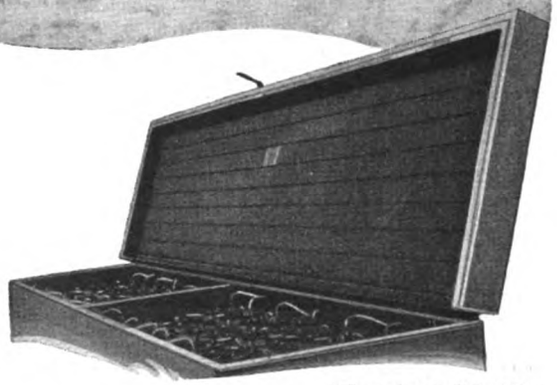
Below—All four propellers of the Leviathan may be seen in this photograph taken in the Commonwealth drydock, Boston



Five masted barkentine, Buccaneer, remodeled at Tebo plant, Todd Shipyards Corp., as quarters of the Buccaneer's club of New York



Radio Insurance *on the* S.S. Cuyamapa



This is the 60-cell Exide Battery that insures plenty of current in emergencies for the radio of the S. S. Cuyamapa.

This Exide Marine Radio Battery is a dependable source of current for emergencies

THE S. S. Cuyamapa plies between New York and Porto Cortez. This means that the emergency radio battery must stand up under abrupt changes of temperature.

When the S. S. Cuyamapa was designed, its owners, the Cuyamel Fruit Company, realized the importance of a dependable battery for emergency radio service. So a battery that could absolutely be relied on was selected—an Exide.

The Exide Marine Radio Battery gives steady, dependable service because it is built especially for marine radio use. It stands up through the most severe changes of weather. It gives abundant power for any emergency. And—most important of all—it passes inspections every trip.

Exide Marine Radio Batteries have proved their dependability on the ships of many famous lines. Year after year they continue in service—always efficient, always dependable.

Before selecting your next emergency radio battery, it will pay you to hear the Exide story. We shall be glad to send you full information, or, if you prefer, a representative to discuss the matter.

Exide

BATTERIES FOR MARINE RADIO

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	408	1,679,912	468	1,962,365
January	417	1,736,991	455	1,868,270
December	466	1,867,630	548	2,171,938
November	454	1,909,756	477	1,885,401
October	486	1,954,853	542	2,301,465
September	492	2,087,694	543	2,270,398
August	491	2,034,147	507	2,075,643
July	493	1,943,133	546	2,251,396
June	542	2,337,678	563	2,279,208
May, 1926	448	1,856,777	538	2,126,788

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
January, 1927	79	208,354	59	167,258
December	145	373,902	129	341,421
November	168	429,403	139	377,016
October	145	370,112	128	329,420
September	107	234,144	82	196,434
August	109	248,435	81	170,661
July	92	191,680	69	128,381
June	104	229,651	56	109,561
May	97	215,829	69	151,287
April, 1926	80	185,401	61	135,919

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	83	277,063	40	119,246
January	88	266,147	51	159,241
December	97	286,013	52	170,314
November	89	275,245	56	177,876
October	109	300,921	58	171,933
September	105	308,189	83	246,136
August	128	321,377	96	206,879
July	152	336,135	108	274,513
June	164	370,526	109	262,468
May, 1926	134	277,009	111	261,878

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	23	65,826	21	59,178
January	25	59,155	26	66,791
December	32	71,748	34	77,400
November	20	34,092	20	34,917
October	20	48,468	23	52,900
September	24	43,783	19	35,828
August	23	47,089	26	45,669
July	27	47,885	26	47,569
June, 1926	29	44,390	29	46,942

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	3	10,380	6	23,696
January	3	9,632	6	20,091
December	5	17,666	5	19,074
November	2	7,689	2	7,690
October	7	23,091	8	29,815
September	5	20,651	5	22,324
August	6	20,764	3	12,299
July	7	29,207	5	18,641
June	5	17,954	3	8,355
May, 1926	7	25,057	6	20,806

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	15	63,320	28	106,355
January	29	102,736	39	134,127
December	34	131,426	56	213,861
November	34	135,455	48	173,820
October	41	151,013	59	217,745
September	33	126,772	56	201,152
August	40	150,609	46	167,419
July	24	93,977	33	127,270
June	22	77,850	45	156,103
May, 1926	35	128,351	43	152,890

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	100	308,501	95	301,401
January	117	362,553	126	361,277
December	245	722,141	269	783,058
November	292	818,707	298	853,723
October	271	791,999	261	783,263
September	230	678,127	224	670,465
August	228	672,453	221	639,677
July	211	644,261	202	603,648
June	138	402,230	132	371,781
May, 1926	120	369,729	121	355,443

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	31	88,928	77	232,403
January	49	134,238	118	350,311
December	216	636,483	254	781,545
November	184	527,290	281	782,914
October	252	683,297	307	850,828
September	252	705,604	281	766,503
August	188	545,861	256	733,837
July	267	727,374	309	854,305
June	78	215,803	171	502,701
May, 1926	40	107,858	140	368,515

Savannah

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
January, 1927	39	.....	34	96,410
December	38	107,763	36	104,445
November	40	97,689	33	102,822
October	50	115,821	39	98,521
September	46	120,271	42	113,706
August	42	97,563	30	76,030
July	33	88,673	27	71,040
June	43	106,733	36	95,000
May	36	96,175	32	85,198
April, 1926	37	104,323	36	105,821

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	90	101,179	84	102,571
January	89	116,112	89	119,191
December	92	113,985	87	104,448
November	97	116,965	97	115,032
October	78	92,987	79	96,718
September	81	91,321	80	88,844
August	84	98,702	87	99,362
July	78	86,124	77	86,323
June	94	110,100	94	108,581
May, 1926	114	126,089	109	120,597

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	99	249,158	86	199,907
January	96	224,819	83	191,752
December	82	164,129	82	174,618
November	90	200,301	83	182,839
October	98	213,430	99	211,785
September	84	179,225	75	165,838
August	89	166,164	81	158,197
July	86	153,642	84	159,256
June	89	168,610	89	163,318
May, 1926	99	183,795	95	191,442

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	40	170,776	45	195,692
January	53	233,914	47	192,233
December	42	176,065	54	201,988
November	63	234,742	54	231,343
October	56	236,587	55	230,412
September	54	219,623	58	233,320
August	53	229,111	48	206,042
July	35	146,670	31	126,407
June	39	165,989	42	181,090
May, 1926	39	159,755	44	163,718

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	240	632,092	249	628,762
January	240	697,039	244	712,284
December	259	745,636	266	755,204
November	253	731,871	238	685,253
October	236	673,606	250	721,608
September	226	620,095	240	666,778
August	275	764,464	256	721,654
July	263	716,066	270	739,005
June	255	658,385	221	665,960
May, 1926	287	753,621	284	772,138

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net. tonnage	—Clearances— No. ships	Net tonnage
February, 1927	27	81,829	33	158,088
January	33	96,054	31	77,315
December	33	94,427	39	102,724
November	39	114,449	39	103,266
October	11	32,323	15	40,127
September	22	65,872	34	98,447
August	24	64,334	20	51,505
July	13	37,020	13	33,908
June	8	27,095	10	30,601
May, 1926	5	18,321	10	20,514

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	43	114,628	82	248,364
January	47	146,318	97	318,609
December	56	147,040	103	302,474
November	64	180,917	118	359,948
October	47	112,816	118	352,203
September	52	139,219	127	368,302
August	55	129,477	131	389,432
July	60	164,241	116	352,290
June	53	119,497	72	185,444
May, 1926	28	65,578	61	180,449

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	144	418,190	144	404,753
January	137	420,426	138	381,692
December	155	438,464	123	386,004
November	184	439,736	138	337,937
October	187	448,038	155	421,807
September	151	406,314	211	386,739
August	143	458,240	151	399,349
July	127	460,296	103	352,367
June	123	349,936	88	344,187
May	133	376,720	112	351,123
April, 1926	149	434,866	130	370,158

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	147	561,214	138	513,253
January	133	497,560	141	522,806
December	134	520,962	134	500,347
November	128	543,103	139	512,671
October	145	532,024	153	575,263
September	170	568,323	156	561,513
August	169	580,310	111	466,346
July	160	523,527	102	495,849
June	142	561,774	100	419,036
May, 1926	154	605,068	116	428,814

Port Arthur

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1927	34	80,063	31	84,324
January	22	57,644	28	84,531
December	25	72,885	31	100,184
November	25	67,293	31	96,171
October	19	53,558	23	71,270
September	15	43,874	22	72,960
August	19	63,639	24	71,545
July	25	79,464	32	98,637
June	22	70,743	30	97,056
May	20	60,276	26	95,764
April, 1926	32	95,592	38	108,923

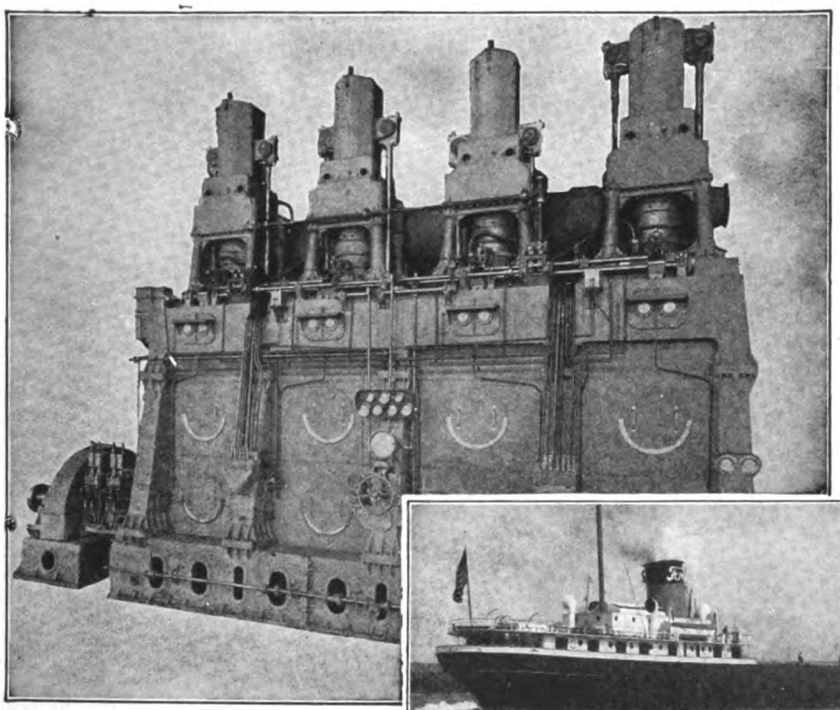
SUN SHIPBUILDING & DRY DOCK COMPANY

Builders of

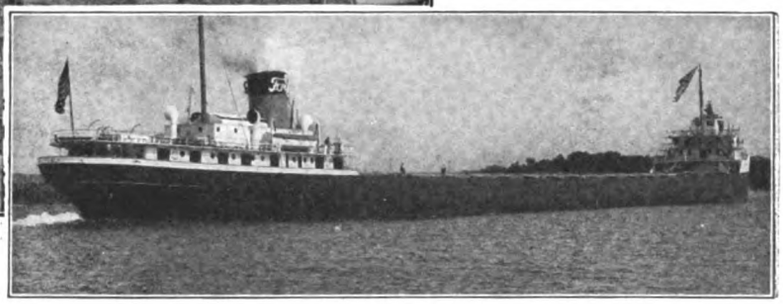
SUN-DOXFORD DIESEL ENGINES

The Engines that Power

"HENRY FORD II" *and* "BENSON FORD"



3000 S. H. P. Sun-Doxford Diesel Engines power the two motorships, "Henry Ford II" and "Benson Ford".



M. S. "Henry Ford II"

SUN-DOXFORD *and* JUNKERS PATENTS

Main Office and Works:
Chester, Pa. - U. S. A.

Philadelphia Office:
Finance Building

New York Office:
Cunard Building

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

DEMURRAGE is merely extended freight, and the purpose of lay days is to fix a period during which the charterer may detain the vessel, and beyond which he must pay for delay as such extended freight in the form of demurrage or damages in that nature. * * * The delay in loading the vessel within the lay days was not a breach of the charter entitling the owner of the vessel to discontinue further performance under the charter party, but an event within the legal contemplation, though it may not have been in the expressed contemplation of the parties, for additional compensation as extended freight. And demurrage is payable, though there is no fault on the part of the charterer."—New York & Cuba Mail Steamship Co. v. Lamborn, 8 F. (2d) 382.

* * *

IT WAS HELD in the case of RIVER QUEEN, 8 F. (2d) 426, that a maritime lien stands on a higher foundation and broader principles than a mechanic's or materialman's lien on a house, and is a debt against the vessel itself, vesting in the creditor, a special property in her, which subsists from the moment that the debt arises, and follows it even into the hands of innocent purchasers. It was also held that a maritime lien on a vessel, for repairs made after taxes became due, but without notice of the government's claim therefor, was superior to the government's lien after levy, notwithstanding the tax lien related back to the time when the taxes became due.

* * *

FAULT or negligence may not be charged to a tug where it had sufficient power to command and navigate a tow when it started out, and especially where it encounters unusual conditions of wind and tide.—MARY T. TRACY, 8 F. (2d) 591.

* * *

A SHIP-REPAIRING company was not chargeable with a ship's fault in leaving a hatch open, or liable for failure to warn an employe of dangers, where the employe who fell therein was equally familiar with the conditions. It is not negligence to leave a cargo hatch open, if the ship is awaiting cargo, though it is negligence to leave a coal hatch open.—Hardie v. New York Harbor Dry Dock Corp., 9 F. (2d) 545.

* * *

A STEAMER in a fog must control speed. so that she can avoid collision with another; herself observing proper precautions. * * * It is well established that the tow, if inert and helpless, is not responsible for the faults of the tug. * * * It is not a fault to be without steam while in tow."—Naamlooze Venootschap Maatschappy Stoomschip BARENDRECHT v. Noran Towing & Transportation Co., 9 F. (2d) 714.

* * *

ONE whose barge was sunk after collision with the wreck of a merchant vessel owned and used by the United States, which wreck was not marked with buoy, beacon, or light, as required by statute, may recover from the United States; unlawfully leaving an unmarked wreck in a navigable channel being a maritime tort.—Eastern Transportation Co. v. United States, 47 Supreme Court Reporter 289.

* * *

A "DEVIATION" by a vessel, said the Supreme Court in the case of WILLDOMINO, 47 Supreme Court Reporter 261, is a voluntary departure, without necessity or any reasonable cause, from the regular and usual course of the ship. It was further said that a vessel leaving for a destined port with a grossly inadequate supply of coal, with the intention to proceed to another port under the pretense of emergency, made an inexcusable deviation, making it liable as an insurer for any damage suffered by cargo, since, it having the privilege of going to such port, it was her duty to take ordinary course.

* * *

WHERE fishing schooner would have reduced mackerel catch to possession, if purse line of seine had not parted, the seller of the line, it was held in Linen Thread Co. v. Shaw, 9 F. (2d) 17, was liable for the loss as damages for breach of an implied warranty.

* * *

A TUG, bringing a barge which she had in tow into collision with a barge lying alongside a pier, damaging her about three feet above the water line, was held in the case of MARS, 9 F. (2d) 183, not to be liable for damages due to sinking and expense of raising as the result of continued loading after the collision, causing the barge to settle until the opening in her side was below the water level. The court stated the rule as to dividing damages in these words: "Where two joint wrongdoers contribute simultaneously to an injury, then they share the damages; but where one of the wrongdoers completes his wrong, and the subsequent damages are due to an independent act of negligence, which supervenes in time, and which has as its basis a condition which has resulted from this act of negligence, in that case they do not share; but in that case we say that the consequences of the first act of negligence did not include the consequences of the second."

* * *

A VESSEL at fault for a collision cannot be held liable for increasing damages by the subsequent negligence of the vessel injured."—EDWARD A. UHRIG, 9 F. (2d) 185.

* * *

WHERE the primary cause of a collision between a steamship and a pilot boat was the fault of the latter, to sustain the apportionment of the steamship's damages between it and the pilot boat, the presumption of the law is against the pilot boat, and against apportionment, unless that vessel can, by clear and convincing proof, establish contributory fault on the part of the steamer.—LA FLANDRE, 9 F. (2d) 331.

* * *

MARITIME lien on a vessel cannot be created by contract of her master, made while she is in custody of officers, who had seized her for violation of the immigration and custom laws; nor can such lien be created by contract of the master with an attorney to defend him and the crew on the charge of violating immigration and customs laws.—JEANETTE, 9. F. (2d) 408.

* * *

A SHIP which received a specific lot of cement from a particular consignor, regardless of marks and brands, had the duty to so segregate the shipments from other merchandise of like kind that it could and would be discharged separately, and not confused with the other merchandise; the consignee of cement of a particular brand has the right to assume that it, and no other, will be delivered, it was decided in CARDIGANSHIRE, 9 F. (2d) 416. The court also held that "arrival of ship," within the meaning of bills of lading requiring claims to be filed within a specific time after "date of the arrival of the ship at destination," must be construed, where misdelivery is charged, as meaning date when the cargo is discharged or offered for delivery.

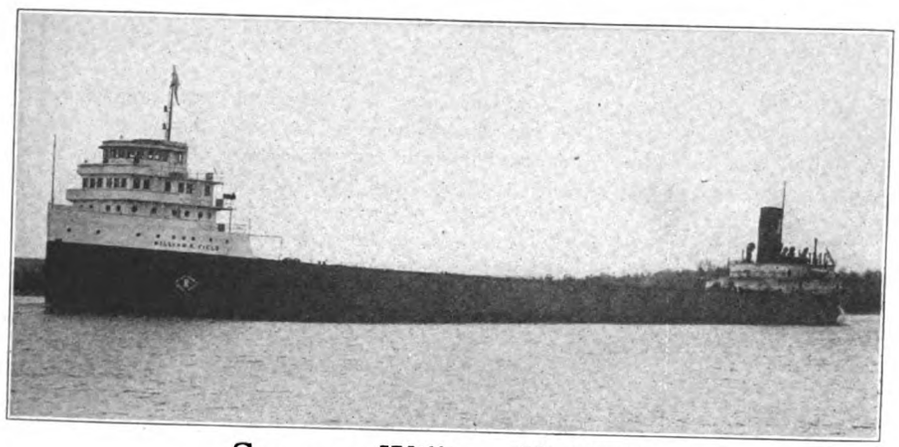
* * *

A TIME charter, by which the owners of a vessel remained liable for wages and provisions, and the charterer agreed to provide bunker coal and passenger expenses, the captain being under orders of the charterer, was held in the case of PENZA, 9 F. (2d) 529, not to be a demise, and hence the captain was the owners' master, and not the charterer's.

Toledo Shipbuilding Company Inc.

TOLEDO - - - OHIO

Builders of the World's Record Cargo Ship



Steamer William K. Field

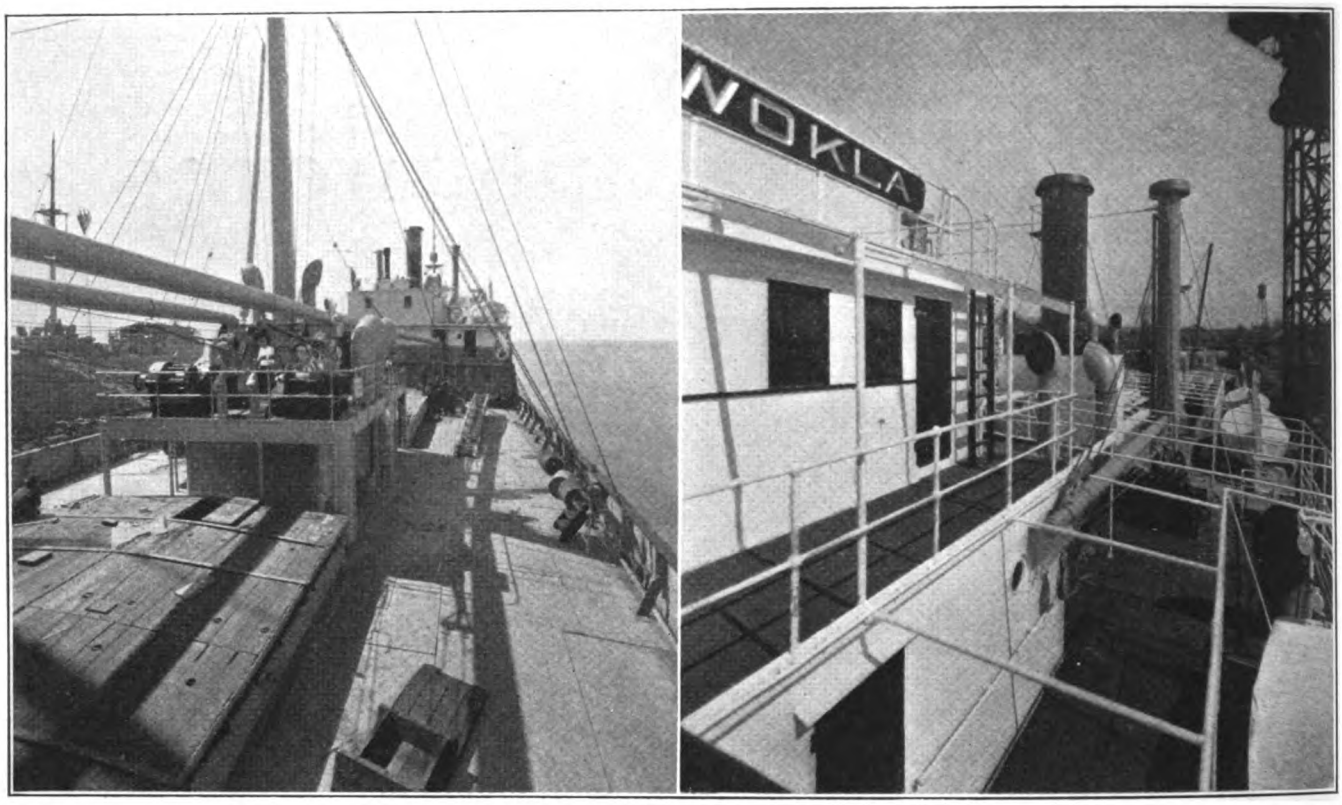
604 ft. Long, 60 ft. Beam, 32 ft. Depth. Deadweight Tonnage 12000.

OVER half a million tons of freight carried—forty six cargoes of ore and coal delivered in seven months and seventeen days by the steamer William K. Field.

This remarkable performance earned her the title, "Champion Freight Carrier of the World". During the season 1924 on the Great Lakes she registered a total of 552,014 tons. *An unprecedented accomplishment!*

The William K. Field is owned and operated by Reiss Steamship Company, Cleveland, Ohio. Her type of construction permits rapid loading and discharge of cargo. This was an important factor in her record breaking performance.

Builders and Repairers of Ships and Engines



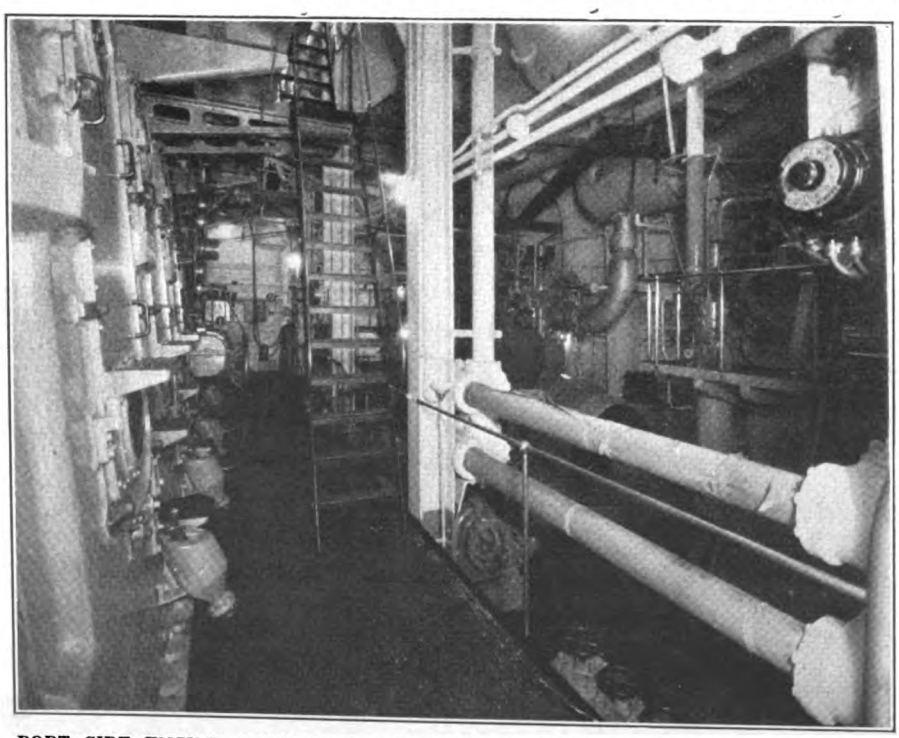
M. S. SAWOKLA CONVERTED SHIPPING BOARD FREIGHTER—AT LEFT—ON DECK, FROM THE STERN LOOKING FORWARD—WINCHES ARRANGED ON RAISED STEEL PLATFORM—AT RIGHT—ON THE BOAT DECK LOOKING AFT—PILOT HOUSE AND CAPTAIN'S QUARTER'S—LIFEBOATS AND SMALL STACK

M. S. Sawokla Trial

(*Continued from Page* 67)

tions per minute during the speed run was 88.25, though this figure was in some doubt as the counter was not in good order. The average speed observed was 12.86 knots and the speed from revolutions and propeller pitch was 12.20 knots. The negative slip would indicate that the revolutions as observed were somewhat in error. Brake horsepower of the engine averaged 3090 and the indicated horsepower averaged 4152 during the speed trial. Both of these figures were taken from the power and revolutions curve developed during shop tests of the engine. Average fuel per brake horsepower per hour was 0.42-pound and per indicated horsepower per hour 0.312-pound based on the power developed by the main engine.

It is anticipated that a speed in service fully loaded of 12.25 knots can be maintained. Considering the size of the vessel and the low fuel consumption this should make a very economical unit especially in long voyages with much time at sea. Calculated on the 760 tons fuel oil capacity in the inner bottoms this vessel will have an effective radius of



PORT SIDE ENGINE ROOM M. S. SAWOKLA—AT LEFT—OPERATING SIDE OF 3000-HORSEPOWER BUSCH-SULZER DIESEL—AUXILIARIES AT RIGHT

TABLE I

Sawokla Characteristics

Length over all, feet, inches	416 0
Length between perpendiculars A. B. S., feet, in.	402 0
Beam molded, feet, inches	54 0
Depth molded at side to shelter deck, feet, inches	33 0
Displacement at normal mean loaded draft, tons	13,010
Gross tonnage	5,878
Net tonnage	3,689
Normal mean load draft, feet, inches	26 10¾
Deadweight capacity on above draft, tons	9,105
Bale capacity, not including deep tanks, cu. ft.	455,660
Capacity of deep tanks—salt water, tons	1,053
Capacity of inner bottom fuel oil tanks, tons	760
Normal speed, service conditions, knots	11.6

THOSE Owners and Operators who have sought the Service of this Organization during the past fifteen years in considering the problem of fuel oil burning installation or conversion have found a wealth of experience and background to draw upon.

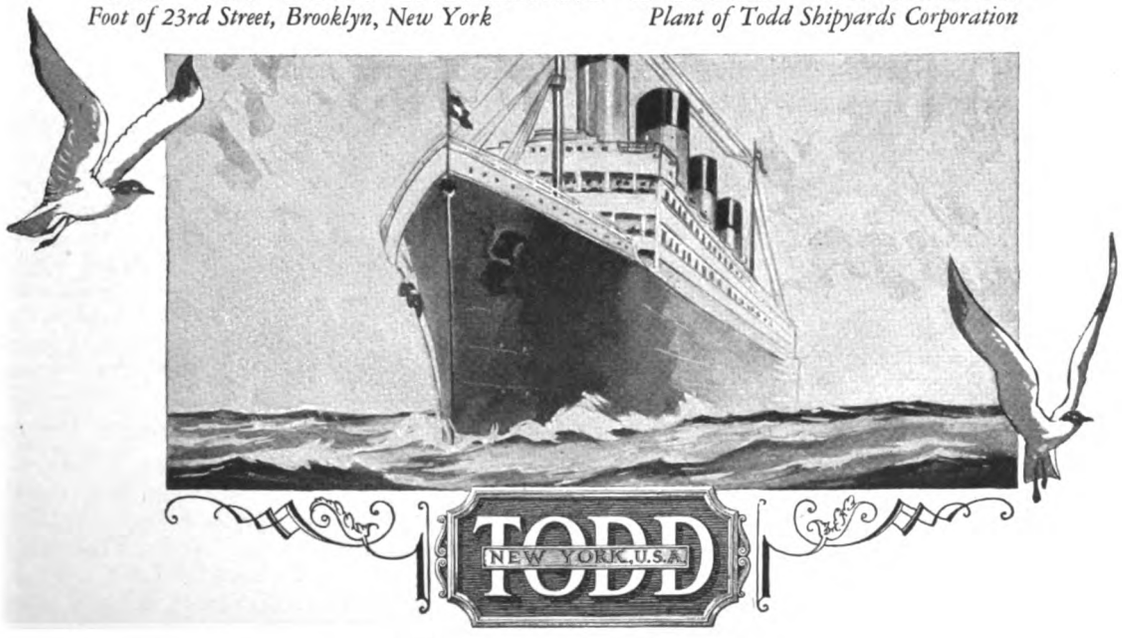
The facilities and resources of this company were originally created for the special purpose of bringing to bear fundamental marine engineering service in the matter of economical steam generation through fuel oil burning equipment.

That we have served in the past, and are continuing to serve the most representative and important marine interests is an indication of our efficient and correct marine engineering practice. Fuel oil burning equipment and installation has been made for the following well known lines, owners and operators.

American Hawaiian S. S. Co.
American Sugar Refining Company
Atlantic Fruit Co.
Atlantic Gulf Oil Company
A. H. Bull & Company
Canada Steam Ship Lines, Ltd.
Canadian Gov't Merchant Marine
Canadian Pacific Railway
Canadian Pacific S. S. Ltd.
China Mail S. S. Co.
City of New York
City of Philadelphia
Clyde Steamship Company
Cosulich Line of Trieste
Cunard Line
Dollar Steamship Line
Ford Motor Company
Furness-Withy & Co., Ltd.
W. R. Grace & Company
Gulf Refining Company
Hudson River Day Line
International Mercantile Marine Lines
Isthmian Steamship Lines
Lamport & Holt S. S. Company
Luckenbach S. S. Co.
C. D. Mallory & Company
Merchants & Miners Transportation Co.
Merritt-Chapman & Scott Corporation
Mexican Government
Mitsui & Company
Moore & McCormack Co., Inc.
J. P. Morgan
New York Central R. R. Company
N. Y. & Cuba Mail S. S. Company
N. Y. N. H. & H. R. R. Company
New York & Porto Rico S. S. Co.
New Zealand Shipping Co., Ltd.
Oriental Navigation Company
Pacific Steam Navigation Co.
Pacific S. S. Co.
P. & O. Steam Navigation Company
Pan-American Pet. & Trans. Co.
Royal Mail Steam Packet Company
Sinclair Navigation Company
Southern Pacific Company
Standard Oil Company of N. J.
Standard Oil Company of N. Y.
Standard Transportation Co.
Texas Steamship Company
Union Sulphur Company
United American Lines
United Fruit Company
United States Engineer Offices
United States Shipping Board
United States Steel Products Co.
Vaccaro Brothers
Vacuum Oil Company
White Star Line

TODD DRY DOCK ENGINEERING & REPAIR CORPORATION

Foot of 23rd Street, Brooklyn, New York *Plant of Todd Shipyards Corporation*



over 15,000 nautical miles without refueling if fully bunkered.

The main engine operated perfectly during the trials. There was practically no noise and no noticeable vibration either in the engine room or on deck with the exception of the sound made at the air intakes above the fidley which can easily be remedied by installing mufflers if it is considered worth while.

Everyone was impressed with the simplicity of the engine which is of the 2-cycle, six cylinder, single acting, direct reversible, port scavenging, crosshead type. Its ease of operation and evident conservative power rating was remarked upon. In power at revoltions from 90 to 95 per minute for a specified mean indicated pressure of from 85 to 90 and in fuel consumption it exceeded specifications. The weight of the engine as actually installed was 869,000 pounds, or less by over 19 per cent than the limit specified. An illustrated description of this engine appeared in the November 1926 MARINE REVIEW.

TABLE II

Sawokla Conversion Costs

Installation	$227,150
Special alterations	132,800
Main engine, including spares	247,330
Deck machinery, including steering gear, motors, control and cable	29.320
Engine room auxiliaries, including engines, generators, pumps, coolers, switchboard, cable	94,000
Repairs	26,000
Equipment and outfit	25,000
Engineering, purchasing, inspection, traveling, freight, extras, trial trip and incidentals	38,000
Total	$819,600

It may be said that the main engine and the vessel as a whole performed all of its functions to the complete satisfaction of the official shipping board and Merchant Fleet representatives including Jefferson Myers, and Philip Teller, commissioners, W. T. Hayes, of the Fleet corporation, Capt. R. D. Gatewood, manager of maintenance and repair, and J. T. Welsh, chief of the technical section.

Accompanying illustrations were taken shortly before and during the trial. The SAWOKLA was built for the shipping board in 1920 at the Oscar Daniels Co. shipyard in Tampa, Fla., as a three island, schooner rigged, single screw freighter on the Isherwood system of framing, and is 416 feet in length overall and of 9500 tons deadweight. Particulars of the converted ship, the main engine and auxiliaries appear in Tables I and III while the cost of conversion is listed in Table II.

TABLE III

Main Engine and Auxiliaries on M. S. Sawokla

Main Engines

Make: Busch-Sulzer Bros.
Type: Single acting; 2-cycle, air injection.
Diameter of working cylinders, inches: 32.
Stroke, inches: 52.
Number of cylinders: 6.
Brake horsepower: 3000.
Revolutions per minutes: 90.
Piston speed, feet per minute: 780.
Two air starting tanks. Maximum capacity 635 cubic feet each.
Two air starting tanks. Maximum working pressure 400 pounds.
Cooling: Salt water throughout.
Maxim silencer.

Three Auxiliary Engines

Make: Worthington Pump & Machinery.
Type: Single acting; 2-cycle, air injection.
Diameter of working cylinders, inches: 12½.
Stroke, inches: 13¼.
Number of cylinders: 3.
Brake horsepower: 115.
Generator: 75-kilowatt, 240-v.; Ridgway.
Cooling: Jackets, salt water; pistons, oil.
Revolutions per minute: 265.
Piston speed, feet per minute: 585.
Excess air capacity, cubic feet each: 170.
Maxim silencer.

Emergency Light and Compressor Set

Make: Mianus Diesel Engine Co.
Type: Single acting; 2-cycle; solid injection.
Diameter of working cylinders, inches: 5⅞.
Stroke, inches: 7⅛.
Number of cylinders: 3.
Brake horsepower: 22.
Revolutions per minute: 550.
Piston speed, feet per minutes: 653.
Cooling: Salt water.
Generator: 15-kilowatt, Diehl.
Rix compressor.
Maxim silencer.

Pumps, Water

Manufacturer: Nash Engineering Co.
Salt water cooling: One 750 gallons per minute, self-priming, centrifugal, motor drive, General Electric, 30 horsepower.
General Service: One 750 gallons per minute, self-priming, centrifugal, motor drive, General Electric, 30 horsepower.
Fire: One 200 gallons per minute, centrifugal, motor drive, General Electric, 20 horsepower.
Engine room bilge: One 300 gallons per minute, self-priming, centrifugal, motor drive, General Electric, 7½ horsepower.
Fresh Water: (washing), one 70 gallons per minute, self-priming, centrifugal, motor drive, General Electric, 7½ horsepower.
Sanitary: One 70 gallons per minute, centrifugal, motor drive, General Electric, 7½ horsepower.
Fresh water: (portable), one 35 gallons per minute centrifugal, motor drive, General Electric, 1½ horsepower.

Pumps Oil

Manufacturer: Kinney Mfg. Co.
Lubricating oil: One rotary plunger, 150 gallons per minute, motor drive, General Electric 7½ horsepower.
Fuel Oil Transfer: One rotary plunger, 150 gallons per minute, motor drive, General Electric, 7½ horsepower.

Boiler

Vertical type, working pressure 110 pounds, gage, 173 square feet heating surface.
Oil burner: Sunbeam centrifugal atomizer.

Ice Machine

York, 2-ton ,ammonia direct expansion type, direct driven by Diehl motor, 235 revolutions per minute.

Propeller

Four-bladed built up type, diameter 17 feet 9 inches, pitch 14 feet 0 inches.

Steering Control

Sperry-telemotor, Westinghouse control panel—automatic, hand, with automatic follow-up, hand, non-follow-up.

Winches

10 Cargo, 1 warping, Lidgerwood Mfg. Co., self-oiling, special design, electric-driven, Westinghouse motor and control, improved cam-type controller.
Winches fitted with Cutler-Hammer shoe brakes.

Windlass

Rebuilt for motor drive. Westinghouse 45-horsepower motor and control panel, Cutler-Hammer shoe brake.

Fire Extinguishing System

Walter Kidde CO_2 Lux system, eighty 50-pound cylinders for CO_2, 24 hand CO_2 containers, fire main (water).

Radio

Equipment installed by Independent Wireless Co.

Galley

Range: New York French Range Co., oil-fired, fitted with Ray burner.
Coffee urn and water boiler, electric: Automatic Electric Heater Co., radiant type, specially designed, 4.5 kilowatts.
Capacities: coffee, 5 gallons, water 14 gallons.
Hot water heaters: Main, Automatic Electric Heater Co., 4.5 kilowatts—100 gallons.
Crew, Automatic Electric Heater Co., 1.5 kilowatts, 15 gallons.
Radiator in carpenter shop, electric, 1 kilowatt.

Whistle

Sperry, visible type.

Searchlight

Sperry Incandescent—1000 watts.

Oil Separators

Manufactured by De Laval Separator Co.: Two for fuel oil, 300 gallons per hour, of pressure type. One for lubricating oil, 150 gallons per hour, of open type.

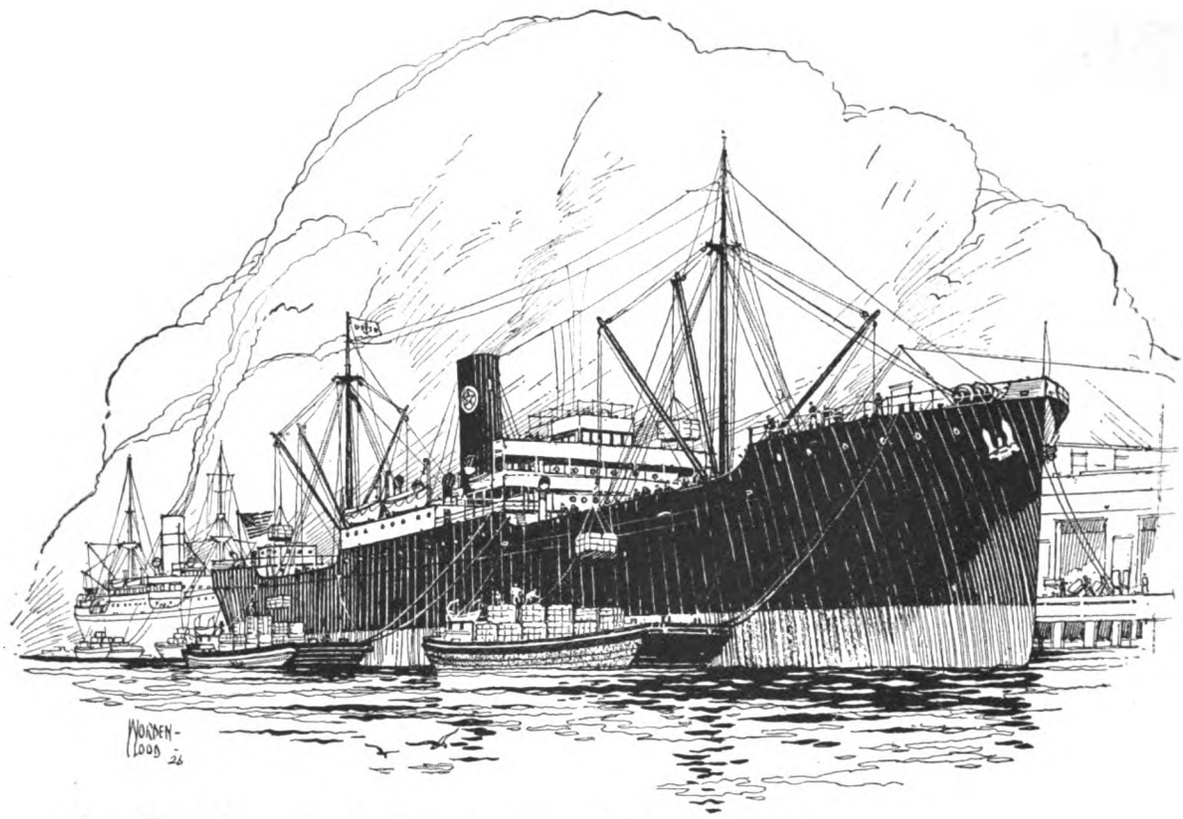
All of the auxiliaries below and on deck are electrically driven. As in the case of the other converted vessels the winches have been located on raised platforms to expedite the handling of cargo. A complete description of this arrangement and of the auxiliaries in general will be found in the story on the M. S. TAMPA in the December 1926 MARINE REVIEW.

Accommodations in comfortable rooms have been provided for 15 passengers. The crew permanently assigned to the vessel was in charge during the trials under command of Capt. W. H. Lee and Chief Engineer C. Carageorge.

Capt. E. E. O'Donnel, vice president and general manager of C. H. Sprague & Son, Inc., Boston, was an especially interested observer, as the M. S. SAWOKLA, immediately after her trial, being assigned to his company for one trip, made preparations to begin a voyage to South America.

Order Lake Freighters

N. M. Paterson, head of the Paterson Steamship lines recently ordered in England from the firm of Swan, Hunter and Wigham Richardson, Wallsend-On-Tyne five new lake freighters of Welland canal size.



A World-Wide Freight Service By American Ships

SAILING under the American flag, and operated for the United States Shipping Board, great fleets of cargo vessels maintain speedy and efficient freight services from all the leading American ports to all parts of the world.

These services have proven highly beneficial to American manufacturers in opening up new and untapped markets for their merchandise and adding to the volume and variety of their foreign trade. Experienced shippers use them regularly and recommend them with enthusiasm.

Speedy passenger ships of the United States Lines are included, sailing from New York to principal European ports. In addition to carrying passengers, the United States Lines ships, led by the famous Leviathan, provide an exceptional express freight service.

For complete information on either freight or passenger service consult "Schedule of Sailings," a comprehensive publication issued by the Traffic Department, or write direct.

United States Shipping Board Merchant Fleet Corporation

WASHINGTON, D. C.

Reduce Lake Vessels' Fuel Bill-III

A Study of the Influence of Boilers, Main Machinery and Auxiliaries on Earnings of Great Lakes Cargo Vessels

By Henry Penton

IN RESPECT of main engines it has often been said that no advance has been made in this direction in 40 years and it is very nearly true. Indeed, judging from general results, the movement has been retrograde, but this is not so much the fault of engine design as of other features which have been touched upon. To all intents and purposes the triple engine stands today as when it made its entree in 1888. Improvements in design and performance which have demonstrated themselves in other lines of engineering have made no impression afloat. Even devices well known and proven 50 years ago as contributing to economy have been discarded. Above all things simplicity and reliability have been watchwords and, as words go, they have done pretty well, but they are a synonym for backwardness and inertia. Therefore we have stuck to the plain multicylinder engine with positive valve gear with all its crudities and inefficiencies, deceiving ourselves with the idea that we were thereby insuring dependability by continuing to use something that is found almost nowhere on earth outside of a ship's engine room, while day by day, year in and year out, the things which go to improve efficiency and economy and which we tell ourselves are not dependable, go on performing their functions with even fewer troubles and interruptions than the dependable apparatus we have tied ourselves up to.

This is no fault of an engine builder —he has always known of these things and has been ready and willing and able at any time to put them into practice but he can only give the owner what the latter wants and is willing to pay for, and the responsibility for the dead-end at which marine engineering has been standing for these many years lies squarely at the owner's door.

For example, over 50 years ago, the Corliss engine was in use in a lake ship. To be sure it was a single-cylinder engine, but of fair size as engines went in those days, and the introduction of the compound engine at about that time (in 1872 to be exact) with its immediate great economies pushed the other to one side, but the old Corliss was a wonder of economy in its day and continued to be good for many years until the ship burned in the Detroit river in the eighties.

Over 50 years ago the Cromwell line on the Atlantic coast used poppet valves and releasing gear in large single-cylinder engines, larger than anything of the kind ever used in lake practice, and obtained a fuel economy, according to published reports, that compares favorably with almost any of our modern triple ships in spite of the comparatively low steam pressure employed at that time, reaching a reported consumption of 1.33 pounds per indicated horsepower per hour.

The New York & Mexico Mail S. S. Co. used Corliss releasing gear in engines of similar type and size in its ships about the same time. In both cases the engines made about the same revolutions as are customary with modern engines but very much higher piston speed because of their longer stroke. Both designs were purely American and no record has been found of their appearance elsewhere until lately. The fuel economy question in Europe being more pressing than with us has led to the reintroduction of the poppet valve gear in a number of recent instances with the resultant improvement which was to be expected.

The compound engine as it came to us, and in its extended form of the triple engine, represented simplicity and cheapness of construction in the most extreme degree. The same features account for its retention now. No builder attempts to deny that the ordinary engine is an inefficient agent but so long as his customer is content with cheapness and mediocrity there is no reason why he should shoulder any burden or responsibility without adequate compensation.

During the late war, in an effort to extend the steaming radius of the ships turned out by the lake yards and which by reason of their comparatively small size suffered severely in loss of cargo deadweight due to bunkers, authority was granted to equip one of the ships under contract with an engine with a better type of valve gear than ordinarily fitted. The engine was not designed for the purpose, but one of the standard engines was modified by the substitution of poppet valves and a modern gear. Due to delays of one sort and another the improved engine did not go on trial until some time after hostilities had ceased and the results were no longer matters of moment. However, careful comparisons were made as between the engine with the poppet valve gear and one of the standard type in a sister ship built at the same time and in the same yard and shops, even to the extent of running both ships over the same courses in the same sort of weather and in exactly the same trim and with the same identical crews in the engine rooms. Space does not permit of presenting more than the outstanding features but the full report of the trials was published at the time. The fuel in both cases was oil which made accurate measurement easy by means of carefully calibrated measuring tanks. The difference in fuel per indicated horsepower per hour was 18 per cent but the overall difference was much greater by reason of the fact that to get the same revolutions and speed the older type of engine had to develop so much more horsepower that the figures in favor of the poppet valve engine were about 29 per cent. This additional power appeared to be due to friction losses since there seemed no other way of accounting for it. The instruments were the same in both cases and applied at the same points and checked by alternate observers. It is hardly probable that all the losses were in the older form of valves and gear, extravagant as we know them to be in that respect, and there undoubtedly was much better workmanship put on the substitute engine, but the observations fulfilled most completely and perfectly the expectations of all concerned. The ship went to sea and made several voyages to Europe and on one occasion returning in ballast fought a succession of westerly gales during which time the engines raced continuously for days on end but without the slightest difficulty attending their operation. Her voyage reports.

This is Part III of Mr. Penton's article, Part IV will appear in an early issue.

continued to show even better work as compared with sister ships than disclosed on trial.

This merely shows that as already indicated in the references to other ships, there is nothing in the idea of greater dependability as regards the ordinary type of engine and gear. It is a mental condition purely and simply. All the development and engineering work has been done and paid for and the information and results are available to all.

Economies in Land Practice

Those systems have withstood the tests of service in the largest sizes and under the most severe conditions in shore work to this day. There is no service afloat that calls for greater endurance and dependability than rolling mill work or mine hoisting, both involving reversibility under load conditions not existent or obtainable afloat. Their use permits economies not possible with the ordinary positive gear with piston and slide valves with their enormous clearances and heavy friction losses, leakages, and lack of proper separate control of port openings.

The quadruple engine was taken up for cargo ship work in 1896. The writer built the first quadruple for a Great Lakes freighter in that year, much against his will and convictions, and it was even less of a success than he anticipated, but the principal cause of failure was unlooked for and not attributable to the design. The same phenomenon has reappeared at intervals with both triples and quadruples and is with us today. In fact it undoubtedly supplies at least a partial reason for material differences between identical ships. The best engineering talent in the country was invoked in the effort to locate the trouble and while cylinder condensation was, of course, assumed to exist yet the extent to which it was finally found to be existent was unheard of so far as could be learned. This was doubtless due in part to the fact that while the engines had been designed for a normal duty of about 2000 indicated horsepower they were seldom worked above about 1400, but it was also found to be due in part to the very soft and open iron in the cylinder castings. Subsequently the cylinders were replaced by others of very hard close iron and the condensation apparently reduced to normal.

The opposition to the quadruple was, however, based on other grounds. For equal powers the quadruple engine weighs and costs about 20 per cent more than the triple. For the modern ship this difference represents about 25 tons in engine room weights alone. The use of the quadruple presupposes the use of higher steam pressures and increase of boiler weights also as well as of piping, valves, fittings, etc. The difference in these weights is not easily determined but estimates by shipbuilders place it as between 8 and 20 tons, depending upon the pressure employed and type of boiler selected. It must be obvious that the quadruple must effect such savings as will at least offset the deadweight losses and investment cost and in addition earn a return on the investment. The deadweight loss is cumulative and recurs with every cargo loaded. The added investment amounts to about $20,000. To meet the sum of these charges and losses, assuming two-way loading and 22 round trips per year, the fuel saving would require to be of the order of 35 tons per trip at 1926 fuel costs. While the quadruple engine has a small theoretical advantage over the triple, it is not equal to any such showing as this, and as a matter of fact no accessible reports of trials show that the quadruple even equals the well-proven performance of the triple. No data are available showing that the mechanical efficiency of the quadruple is any higher than the triple, and if this is true, then for equal powers the friction losses in the quadruple must be the greater. It can hardly be denied that maintenance and lubrication are also higher. If any support were needed for the foregoing contention as to relative economy Table II and Fig. 1 accompanying the first part of this article supply it.

Agrees With Dr. Sadler

To sum up then, Dr. Sadler, insofar as the engineering features of operation are concerned, was on safe ground. So far are we indeed from having reached even high ground in our engineering, to say nothing of the limit, or requiring the adoption of new devices and additions of positive added cost and, to say the least, debatable value, we have not even approached the possibilities of familiar apparatus. Here is no suggestion of pioneering or experiment, but a definite back-tracking out of a wilderness of experiment and a half light of accurate knowledge into a clear field, well lighted and over roads on which there is no toll to pay. On the contrary there are clear and definite savings without involving new construction or designs. As to the latter it is not to be construed as inferring departures except as to utilizing for marine work of today those things which we proved to be good two generations ago and which others took up and have used with profit in other fields ever since. Refusal to recognize these facts does not indicate clear intelligent thinking.

Steam duties of 15 pounds per indicated horsepower can be reduced to 11 or thereabouts without hazarding any experiments. There are able engineers both in this country and abroad who maintain that such economies are possible without going to extreme pressures or multiplication of cylinders and parts. Out of a large collection of such matter, the writer has before him as this is written a report of a contract trial conducted by the purchaser (United States navy) of an engine working under substantially similar conditions as to steam pressures, low superheat, revolutions, piston speeds, vacuum, etc., to those commonly found in the trade under consideration. Moreover the engine is not even a triple, but a two-crank compound working at constant load just as the marine engine does, and yet the steam rate is even lower than the figure indicated above. For a contemplated construction program which has been in hand the same builder has offered a guaranteed duty for marine service of about the same figure. The design contemplates compound cylinders and nothing whatever that has not been used before in marine work. In fact the plan bears out in every detail the contentions made herein. All auxiliaries which can be so operated will be worked off the main engine. Superheat enters but is not stressed; it exerts an influence on the steam duty but determination of this point will rest with the apparent influence on boiler performance.

(To Be Continued)

Fuel Prices Reduced

Prices for fuel oil of high grade delivered at ports of the Great Lakes were reduced early in March.

The fuel oil price reductions apply to the 24-26, and 30-32 degrees Baume grades. The still higher grade 32-36 is not affected. The new prices at points on the Great Lakes f.o.b. per gallon are as follows: for 24-26 oil, at Cleveland 6.5 cents, Detrit, 6.5 cents, Buffalo, 6.84 cents, Chicago, 5.38 cents, and at Pittsburgh, 6.60 cents. The prices for 30-32 grade oil at the same places are respectively 7.3 cents, 7.4 cents, 6.1 cents and 7.4 cents. The prices per gallon on the 32-36 grade oil f.o.b. at the same points are respectively, 7.8 cents, 7.7 cents, 7.9 cents, 6.6 cents and 7.9 cents.

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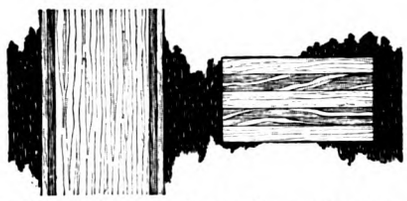

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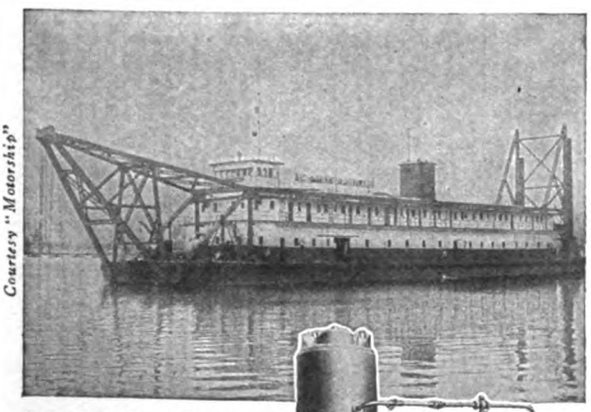

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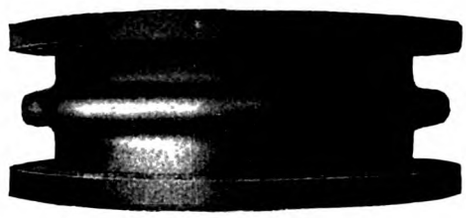

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Late Flashes On Marine Disasters

Brief Summaries of Recent Maritime Casualties— A Record of Collisions, Wrecks, Fires and Losses

Name	Date	Nature	Place	Damage Resulting
Artemis	Feb. 25	Fire	Key West	Total loss
Archer	Feb. 26	Aground	Ambrose	Floated
Aragon	Feb. 8	Collision	Bilbao	Not stated
Asia	Feb. 10	Collision	Piraeus	Not stated
Australien	Feb. 17	Collision	Adelaide	Starboard quarter
Afrika	Feb. 17	Collision	Nr. Hook of Holland	Not stated
Belvernon	Feb. 22	Collided dock	Stapleton	Stern
Black Sea	Feb. 23	Explosion	New York	Considerable
Barge No. 15	Feb. 23	Ashore	Pinnacle Rock	Bow
Beechwood	Feb. 14	Ashore	Off Weymouth	Floated
Benlos	Feb. 17	Fire	Watchet Harbour	Deck; starboard side
Broughty	Feb. 16	Struck rock	May Island	Leaking
Baron Elcho	Feb. 18	Aground	Gurta Crossing	Not stated
Boulonnaise	Feb. 17	Collision	Cardiff Roads	Bows
Blairatholl	Feb. 21	Aground	Charleston	Floated
Bismarck	Feb. 24	Aground	Aberdeen	Floated
Baron Ruthwen	Mar. 14	Collision	Philadelphia	Stem; starboard; bow plates
Brian	Feb. 28	Aground	Blyth	Floated
Barrdale	Mar. 2	Struck subgd. object	London	Leaking
Cecil B. Stewart	Feb. 17	Ashore	New York	Total loss
Columbus	Feb. 22	Ashore	Ambrose Channel	Floated
City of Richmond	Feb. 24	Collision	Off Smiths Point	Sank
City of Annapolis	Feb. 24	Collision	Off Smiths Point	Bow
City of Dallas	Feb. 24	Collision	Houston Ship Channel	Not stated
City of Waterford	Feb. 2	Ashore	Skerryvore Rock	Total loss
Cambrian Maid	Feb. 7	Collision	Antwerp	Above waterline
City of Norwich	Feb. 8	Collision	Adelaide	Not stated
Conset	Feb. 8	Collision	Bilbao	Bow
Camden	Feb. 9	Collision	Gravesend	Starboard quarter
Clara	Feb. 14	Collision	Brunsbuttelkoog	Badly
Cordillera	Feb. 14	Collision	North Foreland	Starboard side
City of Birmingham	Feb. 14	Collision	Barrow Deep	Not stated
City of Cardiff	Feb. 15	Collision	Bremen	Leaking
Campeador	Feb. 17	Collision	Lower Hope	Stem
Churton	Feb. 16	Collision	Off Morpeth Dock	Bulwark rails
Calzean	Feb. 16	Collision	Off Morpeth Dock	Not stated
Carlbeath	Feb. 17	Collision	Belfast	Plates
Circassia	Feb. 18	Collision	London	Plate
Cherryleaf	Feb. 17	Collision	Lower Hope	Port side amidships
Cronshagen	Mar. 2	Collision	Governors Island	Plates
Carna	Mar. 7	Stranded	Ponta Treclosa Cabrea	Waterlogged
Cheong Shing	Feb. 22	Collision	Tientsin	Forehold
Champion	Feb. 28	Collision	New Orleans	Damaged
Deutschland	Mar. 8	Aground	Quarantine	Not stated
Daland	Feb. 17	Collision	Reval	Port side
Elkton	Feb. 17	Disabled	W. of Iloilo	Sank
Evansville	Feb. 18	Collision	Cape Henry	Considerable
Erich Lindoe	Mar. 1	Collision	Red Hook	Bow
Evelyn V. Miller	Feb. 21	Ashore	Mall Bay	Not stated
Endymion	Feb. 14	Collision	Portsmouth	Not stated
Eurana	Mar. 11	Struck bridge	Vancouver	Considerable
F. H. Hillman	Feb. 18	Ashore	St. Nicholas Isl.	Floated
Firmore	Mar. 3	Ashore	Smith Point	Floated
Flamma	Feb. 7	Collision	Off Dagenham	Not stated
Francesco Ciampa	Feb. 11	Collision	Off Dover	Sank
Fianona	Feb. 15	Collision	Nr. Vlaardingen	Stem; plates
Freeman	Mar. 4	Collision	Hampton Roads	Port bow
General Pau	Feb. 22	Hvy. weather	Barbados	Leaking
Gloucester Coast	Feb. 7	Collision	Off Dagenham	Stem
Gobeo	Feb. 14	Collision	Gravesend	Slight
Gorbea Mendi	Feb. 15	Collision	Barry	Not stated
Gastelu	Feb. 18	Collision	Bristol Channel	Bows
Guilia	Mar. 5	Struck dock	New Orleans	Steering gear, stern
Grodno	Feb. 4	Struck rocks	Nr. Corfu	Holed
Hadens Shell barge No. 7	Feb. 18	Collision	Houston Channel	Forward
Hope Sherwood	Feb. 20	Disabled	Key West	Waterlogged
Hilton	Feb. 28	Struck obstr.	Kill Van Kull	Holed
Harlyn	Feb. 10	Ashore	Barrow Deeps	Floated
Hibernia	Feb. 15	Collision	Barrow Deep	Sank
Hollywood	Mar. 5	Fire	San Francisco	No. 3 hold
Harding Highway	Feb. 20	Gale	New York	Serious
Iron Prince	Feb. 8	Collision	Adelaide	Slight
Imperatul Traian	Feb. 9	Stranded on rocks	Constinople	Holed
Jasi	Feb. 16	Collision	Stambul	Not stated
Jessie G. Noyes	Mar. 8	Not stated	At sea	Abandoned
Jellicoe Rose	Feb. 17	Ashore	Deauville	Floated
Jekri	Feb. 20	Collision	Antwerp Roads	Slight
Jan Volders	Mar. 1	Struck sub. rock	Cairns of Coll	Sank
King David	Mar. 2	Aground	Cape Henry	Floated
Kanal III	Feb. 17	Collision	River Elbe	Badly
Kirkaline	Feb. 28	Collision	Off Immingham	Starboard quarter
Luther Hooper	Feb. 26	Sank	Off Point Judith	
Lake Flatonia	Feb. 24	Collision	Houston Ship Channel	Plates
Lodovica	Feb. 2	Ashore	Maldonado	Not stated
Lord Byron	Feb. 9	Ashore	Jaffa	Not stated
Liberator	Feb. 10	Ashore	Hollo Straits	Floated
Lord Rhondda	Feb. 18	Collision	Bristol Channel	Stem
Lebec	Mar. 9	Collision	San Pedro Harbor	Plates
Luther E. Hooper	Feb. 26	Gale	Point Judith	Foundered
Montpelier	Feb. 22	Ashore	Nr. Brake	Floated
Mary E. Moore	Feb. 25	Struck bar	Bandon	Abandoned
Matching	Feb. 17	Collision	Lower Hope	Port side
Matheos	Feb. 16	Collision	Stambul	Stem
Mars	Feb. 17	Collision	River Elbe	Not stated
Mary Jones	Feb. 17	Collision	Bristol	Bowsprit; headgear
Montclair	Mar. 4	Ashore	Off Orleans	Not stated
Marion Phyllis	Mar. 7	Hvy. weather	Halifax	Leaking
Mercator	Feb. 20	Collision	Antwerp Roads	Slight
Miltiadis	Feb. 23	Collision	Marseilles	Slight
Marsden	Feb. 25	Collision	Lower Hope	Undamaged
Millocrat	Mar. 1	Stranded	Off Greenore	Floated
Northern No. 35	Feb. 14	Sank	New York	
Nebraska	Feb. 13	Collision	Dungeness	Considerable
Nidarholm	Feb. 8	Hvy. weather	Danzig	deck; bot.
Nancy	Feb. 21	Ashore	Nantasket	Not stated
Oxonian	Mar. 1	Struck quay wall	Dover	Bows
Olean	Mar. 2	Aground	Chemical Wharf	Floated
O'Boyle No. 12	Mar. 6	Sank	Newton Creek	
Olandese	Feb. 23	Aground	Constantza	Leaking
Oxonian	Mar. 1	Struck breakwater	Dover	Stem; bows
Pere Marquette No. 17	Feb. 24	Struck bot.	Soo slip	Propellers
Plankatank	Feb. 17	Aground	Melford Haven	Not stated
Possidon	Feb. 9	Struck pier	Barry	Plates
Portland Maru	Feb. 10	Collision	Piraeus	Slight
Plodder	Feb. 14	Collision	Portsmouth	Not stated
Port Wellington	Feb. 14	Collision	Dundee	Not stated
Priscilla	Feb. 17	Collision	Off Birkenhead	Starboard quarter
Princess Maud	Feb. 17	Collision	Belfast	Starboard side
Poljana	Feb. 23	Collision	Buenos Aires	Damaged
Planet	Mar. 3	Struck rock	Nr. Vaxholm	Forepeak
Ripogenus	Feb. 18	Collision	Cape Henry	Damaged
Raritan	Mar. 3	Aground	New York	Floated
Rivelin	Feb. 8	Struck quay wall	Milford Haven	Stem; plates
Robert	Mar. 6	Fire	New York	Slight
Romsdalshorn	Mar. 7	Aground	Buenos Aires	Floated
Raleigh	Mar. 10	Sank	Port Newark	
Seminole	Feb. 13	Aground	Off Castle Pinckney	Floated
Susherico	Feb. 15	Aground	Middle Ground Shoals	Floated
Sapinero	Feb. 18	Collision	Houston Channel	Not stated
Sursum Corda	Feb. 26	Ashore	Nr. Dardanelles	Floated
Spetsai	Feb. 3	Collided breakwater	Salonica	Stem; plates
Stuartstar	Feb. 2	Collision	Humber	Plates
Signe	Feb. 11	Collision	Off Dover	Stem
Spa	Feb. 15	Collision	Barry	Slight
Silverfield	Feb. 17	Collision	Off Birkenhead	Bows
Snaro	Feb. 17	Collision	Cardiff Roads	Not stated
Surico	Mar. 3	Gale	Quincy	Rudder
Stavangeren	Mar. 11	Struck logs	New York	Propeller
St. Merryn	Feb. 24	Aground	Blyth	Floated
Sarrebourg	Feb. 21	Ashore	Bone Portsell	Total loss
San Marco	Feb. 28	Ashore	Nr. Start Point	Prop. lost
Student	Feb. 28	Collided wrf.	Willemstad	Damaged
Tinhow	Feb. 8	Struck quay wall	Cardiff	Bows
Truro City	Feb. 17	Collision	Adelaide	Bow plate
Taragona	Feb. 17	Ashore	So. of Arklow	Not stated
Talbet	Feb. 20	Disabled	Ambrose	Not stated
Tuscan	Mar. 14	Ashore	Cove Point	Floated
Upway Grange	Feb. 17	Collision	Lower Hope	Stem
Unity	Mar. 6	Collision	East River	Damaged
Universal One	Feb. 23	Collision	Buenos Aires	Damaged
Unatra	Feb. 24	Fire	Matadi	Total loss
Vendlus	Feb. 22	Ashore	Karigon	Not stated
Vledderveen	Feb. 24	Atranded	Noord	Floated
Wiconisco	Feb. 19	Ashore	Rainsfjord Island	Floated
Wray Castle	Mar. 4	Collision	Hampton Roads	Not stated
Walter Frank	Mar. 6	Sank	West Brighton	
Wicklow Head	Feb. 24	Aground	Nr. Terneuzen	Floated
William Green	Mar. 12	Aground	Ambrose Channel	Floated
Yang-Tse	Feb. 28	Ashore	Nr. Cuxhaven	Floted
Zabalbide	Feb. 17	Collision	Nr. Hook of Holland	Not stated

Pulverized Coal for Marine Use Makes Real Progress

By C. J. Jefferson

WHY should the use of pulverize fuel on shipboard be developed? What are the differences between a power plant at sea and one on the shore that requires this development work? These two questions in brief, cover the problem that was put up to the fuel conservation committee of the shipping board about a year ago.

Why should pulverized fuel be made seagoing? Because when it has learned seagoing ways and learns how to behave itself in a marine plant, it will then effect economies in the operating costs of our existing vessels of such a magnitude that an auditor's statement can be a real pleasure instead of simply "a study in scarlet."

Oil fuel is ideal in many ways for steam generation, but it is absolutely criminal to use it for that purpose when the same results can be obtained from a much cheaper, and more plentiful type of fuel. All engineers have known this for years; it is no new teaching; but when they calculated the difference in efficiency which the average plant would attain oil as compared with coal, and when they tried to sign on satisfactory fire-room crews and found that year after year it has become increasingly difficult to obtain men with sufficient intestinal fortitude to swing on a slice bar and at the same time have enough sense to care about saving b. t. u's, then they were inclined to let their engineering instinct and scruples go by the board and join the criminal band of oil burners.

Hand Firing Too Hard

Those of you who have fought for steam pressure, when rolling some 30 degrees or more with the wheel kicking out, and hell in general broke loose down below, know what it means to drive men when the heat of the fires is burning up the human part of their minds, and you, too, agree that the man who substitutes fuel oil for coal should be blessed.

But, if the boiler efficiencies obtained with oil can be duplicated, and if this duplication can be accomplished in such a way that the operating problem is no greater than that on the oil burner, and if all of this can be done with a fuel that has a b. t. u. cost approximately one-half of that of fuel oil, then it behooves the marine engineering fraternity to bestir itself and find out whether or not this type of power cannot be put to work on shipboard.

That is the reason why the fuel conservation committtee decided to tackle the problem, for pulverized fuel has on numerous shore plants met the condition just cited. But, if this has been worked out on shore, why should there be any marine installation problem? The answer to this is, simply furnace design.

In the average pulverized fuel plant, where the rata of combustion has been less than a pound of fuel per cubic foot of furnace volume, deep or long furnaces have been used, which allowed flame travel of 20 feet or more, which permitted comparatively slow flame propagation, or ignition of the individual particles of coal.

Combustion Space Limited

This type of furnace design is not practical on shipboard, and in the case of the scotch marine boiler, it is not only impractical but impossible. The furnace of a scotch boiler may be made smaller, by installation of refractory lining, by accumulation of ashes and dirt, or by the collapse of the furnace, but it just cannot be made larger, and when you consider the present existing vessels of the merchant marine, you have got to consider scotch boilers, because the large majority of them are fitted with this old-time reliable, but inflexible type of steam generator.

The furnace of the ordinary scotch boiler is approximately 8 feet long up to the combustion chamber, which is about 3 feet deep, giving a total maximum length of flame travel of 11 feet. In fact, this should be reduced to about 10 feet, as impingement of the flame against rear sheet of combustion chamber must be avoided. This gives you one phase of the problem. You are required to cut the length of your flame in half, as compared to the ordinary shore plant.

The combustion space in a three furnace separate combustion chamber type of scotch boiler of 2500 square feet heating surface, which is the typical type of boiler found on the average cargo carrier, will be somewhat less than 500 cubic feet. In order to burn 2000 pounds of coal per hour in these furnaces, you must burn four pounds of coal per cubic foot, or approximately twice as much as the maximum rate, or eight times as much as the average rate attempted in the shore plant, and all must be done in a completely water-cooled furnace without the benefit of stored up heat found in the refractories of the large furnaces of the job on shore. Therefore, the development work that was necessary to produce satisfactory land installations must be carried on to a much greater degree of refinement before pulverized fuel can don its sea togs.

Experiments Started in 1921

Back in 1921, the idea of pulverized fuel for marine purposes, especially for use in scotch boilers, was advocated, and an attempt was made at the Fleet corporation test plant at Chester, to adopt one of the typical stream line type of burner installations, such as were then and are now used with satisfactory results in shore plants. A stream line burner is simply a nozzle, with round or elongated opening, through which the pulverized coal is discharged into the furnace by low air pressure, the balance of the air required for combustion being admitted through shutter fitted slots in the furnace front. This is the simplest type of pulverized fuel burner, and if the furnace is sufficiently large, and it is possible to have from 20 to 25 feet flame travel, this type of burner is fairly successful with comparatively coarse coal.

However, the scotch boiler does not have the large combustion space, nor is 20 feet flame travel possible, and therefore, these initial tests made with the stream line burner were not

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The author, C. J. Jefferson, is head of the fuel conservation section of the Merchant Fleet Corp., United States shipping board. This article represents the revision to March 3, 1927 of a paper presented before the technical committee and members of the American Steamship Owners association, Nov. 19, 1926.

at all successful. The maximum rate of combustion that could be obtained was 2.5 pounds of coal per cubic foot of furnace volume, or a heat released of 32,000 b. t. u. per hour per cubic foot of furnace, and the efficiency of boiler performance was only 54 per cent.

The writer, who was one of the participants of these tests, could not work up any enthusiasm regarding these results, and became a member in good standing of "the criminal order of oil burners." In fact, advocates of pulverized fuel for marine plants were given but little tolerance for the next few years after these tests.

In the meantime, however, the manufacturers of pulverized fuel equipment were not standing still. They realized that the enormous furnaces required for satisfactory combustion were a severe handicap in their competition with stoker installations, and the problem of reducing furnace volume became a serious consideration, so that by 1925, several devices were developed which shortened the length of flame considerably, and permitted reduction in the furnace volumes.

New Equipment Developed

This brought up the question of marine installations again, and after studying the results that had been obtained on shore plants, the fuel conservation committee was convinced that further possible progress made along these same lines would eventually develop a combustion of equipment which would be entirely practical for marine use, and would permit the economies in the marine plant that are today being obtained on shore.

At almost the same time, further stimulus was given to the question by the numerous diesel installations which have been made in the fleets of our foreign competitors.

The fuel economy possible in a diesel installation would drive steam off the seas, if it were not for the high initial cost of dieselization. This high cost has retarded dieselization considerably, but has by no means stopped it, and the steam men have been forced into developing their equipment so as to reduce the differential in the operating fuel cost between the diesel and the steam plant. High pressure, high temperature steam has received a considerable impetus, and with the reinforcement of pulverized fuel, it is possible to meet the challenge of the diesel, not in terms of pounds of fuel per shaft horsepower, it is true, but in the terms which decide whether a business is profitable or not; that is, in the cost per shaft horsepower developed, and this with a plant whose initial cost will be materially less than that of the diesel.

We must always keep in mind that there are a lot of ships afloat today, and the operating cost of these ships to the average shipowner is just as important, if not more so, than the operating cost of new tonnage, and it is for this class of ships that the successful solution of the pulverized fuel problem offers the greatest salvation.

Further Tests Authorized

These facts were all considered by the fuel conservation committee, and they decided that they would tackle the problem. Therefore, arrangements were made with the bureau of engineering of the United States navy, that a series of development tests should be made at the fuel test plant at Philadelphia, using pulverized fuel in a scotch boiler, which was furnished by the United States shipping board from one of the vessels of the laid-up fleet.

The service given by the United States navy to the merchant marine in carrying out these tests is just another example of the service that a trained military organization can give to its country in times of peace as well as in times of war.

The first type of burner selected for test was not chosen so much from its characteristics of being a practical marine type, for, as a matter of fact, it had several marked disadvantages from this point of view, in its state of development as submitted for test, but rather it was chosen to determine the combustion conditions that could be obtained from a burner which was the direct antithesis of the stream line burner.

This burner was the Fuller Lehigh Well type burner, arranged in a vertical plane, and consisted of four nozzles, so arranged that the stream of coal, together with the air necessary for combustion from each of these nozzles, would cut the stream issuing from the adjacent nozzle, setting up a terrific turbulence.

This type of burner has all of the air necessary for combustion used as primary or carrying air, and any attempt to regulate the air supply would have a direct effect on the turbulence produced, and also, inasmuch as an air swept ball type of mill was used to pulverize the coal, it would also have a direct effect on the fineness of the coal.

The boiler used for these tests was not fitted with either air heaters or superheaters, while the boiler used with the stream line burner in 1921 had both of these accessories to improve the boiler performance; yet, these latter tests showed a remarkable advance in performance, as may be noted from the fact that combustion rates as high as 6.19 pounds per cubic foot of furnace volume were obtained with a release of 88,330 b. t. u. per cubic foot, and a boiler efficiency of 68.7 per cent was obtained from the boiler itself, without the aid of either air heaters or superheaters.

At termination of these tests, an air heater has been installed, as it was apparent from these tests that all measures should be taken to speed up flame propagation, and one of the means of accomplishing this end is to have the air necessary for combustion heated to as high a temperature as possible before it enters the furnace. The use of heated air in the pulverized mill also reduces the variable in the fineness of the coal caused by moisture in the fuel.

The question of uniform quality of coal of sufficient fineness to insure satisfactory ignition and complete combustion is of paramount importance in connection with the use of pulverized fuel in marine boilers, just as it is the case in regard to the correct viscosity of fuel oil. In the shore station, a much wider latitude in degree of fineness is permissible, inasmuch as in the large volume furnace with the long flame travel, the coarser particles of the fuel may be ignited further along in the flame travel, and while in the earlier part of the flame the efficiency of combustion may be relatively low, this is compensated for by completion of the combustion in the latter stages.

In the marine boiler, this is not permissible, the limited length of flame travel makes it imperative that complete ignition takes place as soon as possible, and that efficient combustion starts at the very early stages.

Better Results on Latest Test

The present equipment that is under test is the Peabody burner, which is a turbulent burner using both primary and secondary air. The primary air carries the coal to the furnace under comparatively low air pressure and it enters the furnace with the coal though an annular slot in a snail-shaped casting located at the mouth of the furnace. This arrangement is, in effect, an infinite number of nozzles directing a coal stream against the stream from another infinite number of nozzles. These infinite number of streams cutting each other produce a violent turbulence

which is further increased by the admission of the secondary air at the center of the burner.

Official tests have not been completed with this installation, but the preliminary operating runs which have been made indicate a still further advance in the progress of the development of pulverized fuel for marine purposes. In fact, the results obtained show that the original ideal of 80 per cent boiler efficiency in continuous operation when operating boiler at 150 per cent rating is entirely feasible.

The reason for setting this overload clause in the program is based on the fact that the average cargo carrier has three boilers, and it is desired to operate the vessel on two boilers only, thereby permitting the third boiler to be cleaned while vessel is at sea, and so maintain at all times clean fire and water sides in all three boilers instead of waiting until vessel arrives in port, and then cleaning the three boilers, which procedure means a vessel may start out on voyage with all three boilers clean, but on the return leg of the voyage, at a time when bottom conditions are apt to be considerably worse than at the start of the voyage, especially on long runs in tropical seas, her boilers will be comparatively dirty.

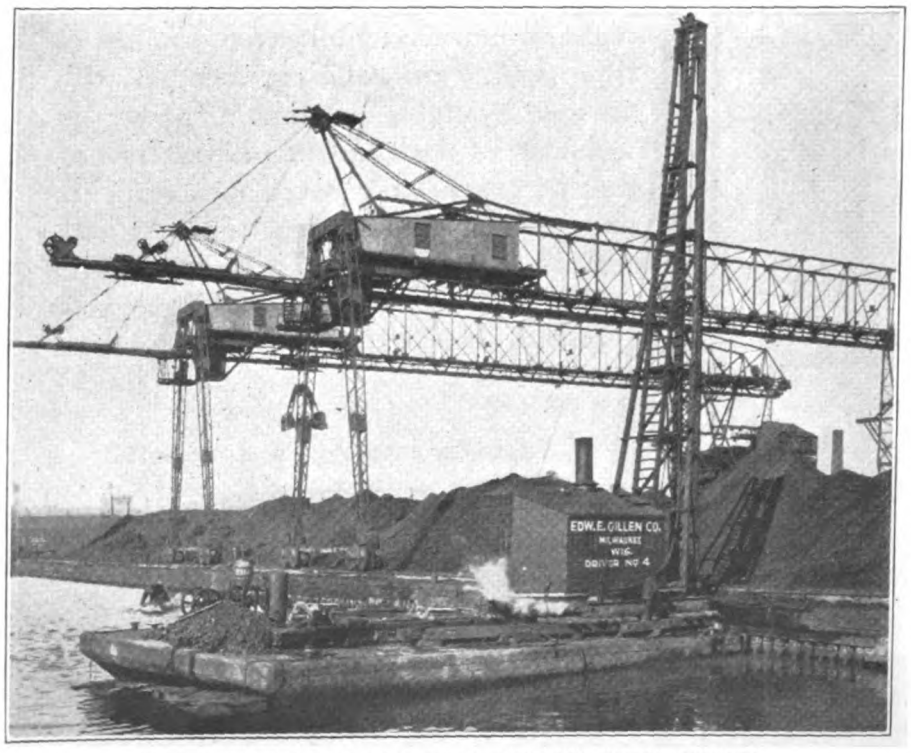
Pulverized fuel for marine purpose has gone through a considerable amount of the development work which will make it real sea-going but it is not quite ready to shove off.

However, it does give most encouraging prospects, and it is safe to say that within a comparatively short time the marine engineer, in studying his operating costs, is going to be forced to consider another competitor against the hand fired coal, or the oil burning steam plant—a competitor which will also question the superiority of the diesel's operating costs, and will have the advantage of a reasonable initial installation charge.

New Channel Steel Barges

A CONTRACT has been let by Merritt, Chapman & Scott Corp., to the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., for a 300-ton derrick barge, to be constructed on the Ellis channel system.

Edward T. Gillen of Milwaukee has ordered two more 90-foot pile driver barges to be built under the Ellis channel system of steel hull construction. These barges are to be duplicates of the Ellis barge built for Mr. Gillen last fall by the Wisconsin Bridge Co. The same company is doing the work on the two new barges which will be ready for launching shortly. The accompanying illustration shows the original channel system pile driver in operation.



PILE DRIVER BARGE BUILT ON CHANNEL STEEL SYSTEM

Largest Diesel-Electric Drive for Tanker

The contract to supply the electric propulsive and auxiliary equipment for the conversion to diesel-electric drive of the former United States shipping board tanker, DISTRICT OF COLUMBIA, which will be the largest drive of this type ever installed, has been awarded to the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

The DISTRICT OF COLUMBIA was built in February, 1921, has a length overall of 450 feet, a beam of 59 feet, and a molded depth of 33 feet, 3 inches.

The new propelling equipment comprises four 8-cylinder, 2-cycle Busch-Sulzer diesel engines of 1000 shaft horsepower each, four 700-kilowatt direct current generators direct connected to the engines, and one double armature propelling motor, rated 3200 horsepower at 90-105 revolutions per minute. Excitation for the generators is supplied by two 175 kilowatt machines direct connected to each of the outboard diesel engines.

Among the larger auxiliary motors are two circulating pump motors of 60 horsepower each, two lubricating oil pump motors also of 60 horsepower each, and a fire and bilge pump motor of the same rating. There are a ventilating blower motor of 35 horsepower, a fuel oil transfer motor of 20 horsepower, and smaller motors for the sanitary pump, refrigeration plant, lighting and other use.

To Build New Carferry

A new carferry is to be built by the Manitowoc Shipbuilding Corp. for the Pere Marquette railroad at a cost of about $800,000. She will be used to carry cars across the river between Detroit and Windsor, Can., and between Port Huron and Sarnia, Can. The design will be similar to that of PERE MARQUETTE No. 14, now in the Detroit river service. Its construction requires 3000 tons of shapes and plates. The vessel will be 400 feet long overall, 53 feet moldel beam and 22 feet molded depth, and will be equipped with four scotch marine boilers and two 3-cylinder compound engines of 1800 indicated horsepower each. Each of the engines will drive a bow and stern propeller, enabling the boat to cross and recross the river without turning around. The new boat will increase the Pere Marquette fleet to ten ferries. Seven are used on Lake Michigan, betwen Milwauke and Manitowoc, Wis. and Manistee and Ludington, Mich.

Passenger Quarters

(*Continued from Page* 69)

is practicable to have eight or more large rooms in the breadth of the vessel.

A system with stateroom bulkheads arranged on the "stepped" principle, applicable particularly when a relatively small number of large staterooms are desired in proportion to the vessel's beam, is shown in plan 2 page 68. The "stepped" principle affords greater veranda width, and corresponding greater range of vision from the windows of staterooms away from the ship's side. This principle as well as the "sawtooth" principle can be applied to any number of staterooms dependent upon veranda space desired or permissable.

Examination of both plans will show that the system consists of staterooms having direct access to a veranda around which they are grouped. Doors to verandas and windows, giving a view of the sea, provide fresh air through the veranda outboard openings, which may be entirely open, enclosed with sash, shellports or airports, according to the deck treated and the service of the vessel. Verandas are also, when desired, provided with wells which afford a circulation of air and light. This is especially desirable when rough or stormy weather might require that the outside shell openings be kept tight.

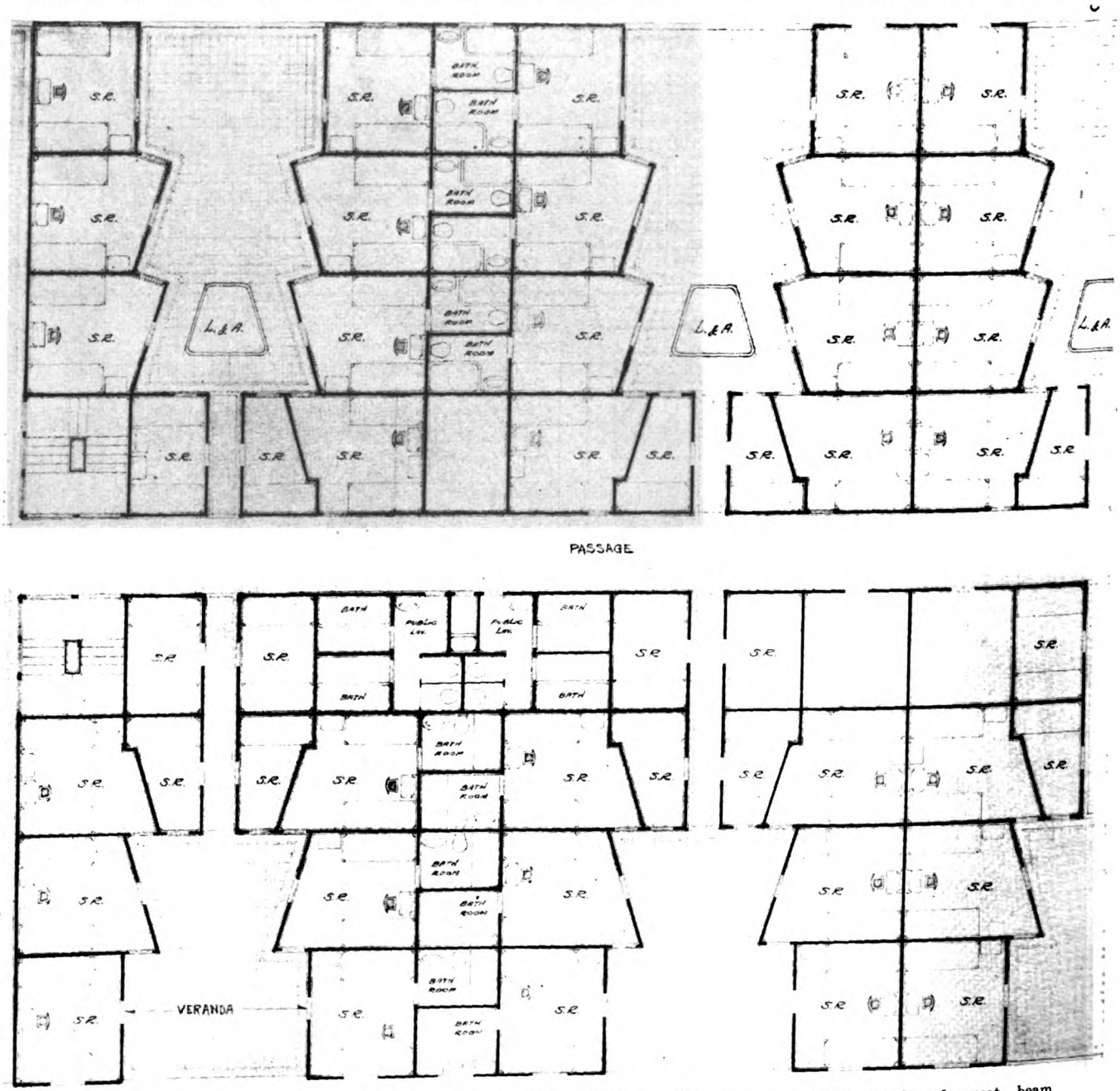
A general arrangement of decks applicable to ocean going vessels embodying a very practicable layout and an economical utilization of deck space has been worked out. Access to saloons, stairs, public spaces and promenade deck is convenient to all rooms by means of a central passage connecting all verandas.

Similar general arrangements applicable to inland, bay and sound or river steamers where the greatest possible number of staterooms are desired, especially for short journeys have also been developed.

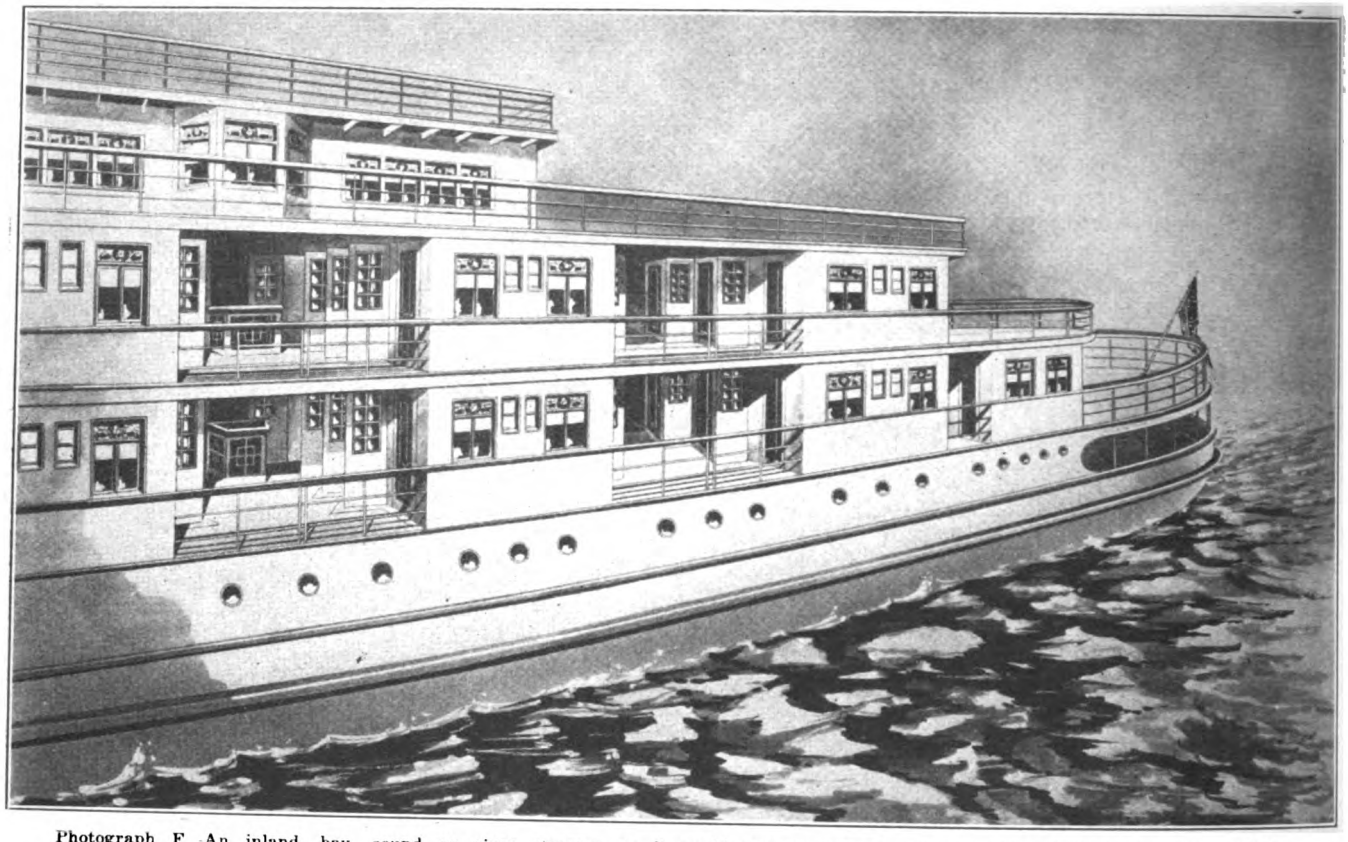
The accompanying photograph A shows typical upper veranda enclosed as might be desired according to deck height above water line and service or trade in which vessel plies. If desired and conditions of service permit this veranda could also be open at the ship's side.

A lower veranda arranged with shell opening by means of hinged shellports is shown in photograph C.

(*Continued on Page* 104)



Plan 1—New system with stateroom bulkheads on the sawtooth principle applied to ocean going vessels of great beam



Photograph F An inland, bay, sound or river steamer as it would appear with the new system of passenger accommodation

If preferred air ports can be used.

A typical stateroom with window opening on a veranda is shown in the accompanying illustration, photograph E on page 69.

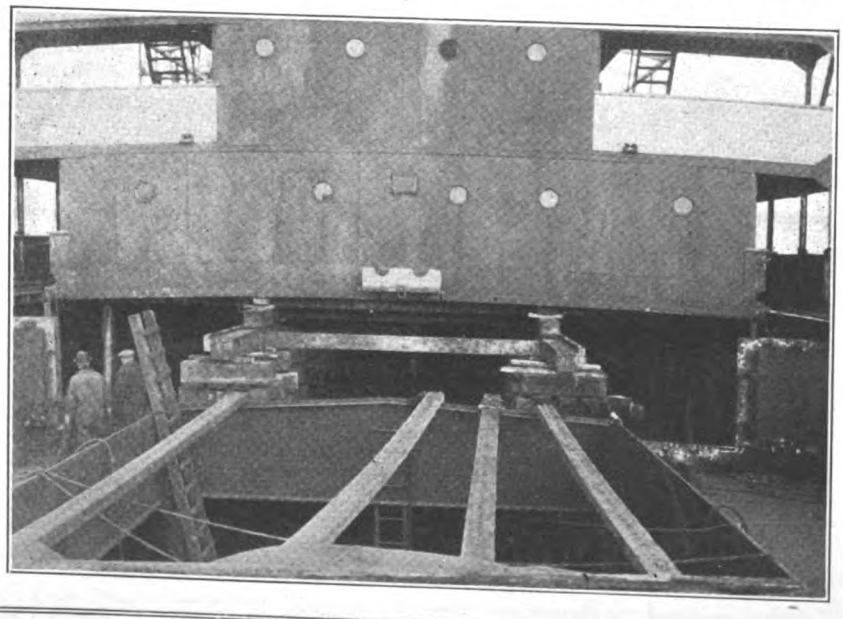
The illustration marked photograph F shows an outboard sketch of the after end of an inland, bay, sound or river steamer as it would appear with the new system of passenger accommodation with verandas open.

The merits of this new system of passenger accommodation may be summarized as follows: A greater number of outside staterooms than otherwise obtainable. An attractive arrangement of staterooms by grouping around verandas, affording ready access to all public spaces on board, yet at the same time providing distinct private deck space for adjoining rooms. A centralized plumbing system by utilization of otherwise inside space for bathrooms and lavatories. More economical utilization of deck space by dispensing with connecting corridors and passageways otherwise required.

It is understood that the passenger accommodation can be increased.

The new system of passenger accommodation illustrated and described in this article is patented and was developed by George G. Sharp, naval architect, New York City.

Bridge Structure Moved on Sliding Ways



ON THE S. S. BERKSHIRE, *ex* EASTERN TEMPEST, *purchased by the Coastwise Transportation Co. and now being converted to a collier at the Fore River plant, Bethlehem Shipbuilding Corp., it was necessary to move a portion of the bridge deck and superstructure. This job was accomplished in the unusual manner shown in the accompanying illustration. The whole structure as a unit was jacked up on greased ways and moved aft a distance of 8 feet. Jacks were used as motive power and the entire moving operation was completed in 2½ hours.*